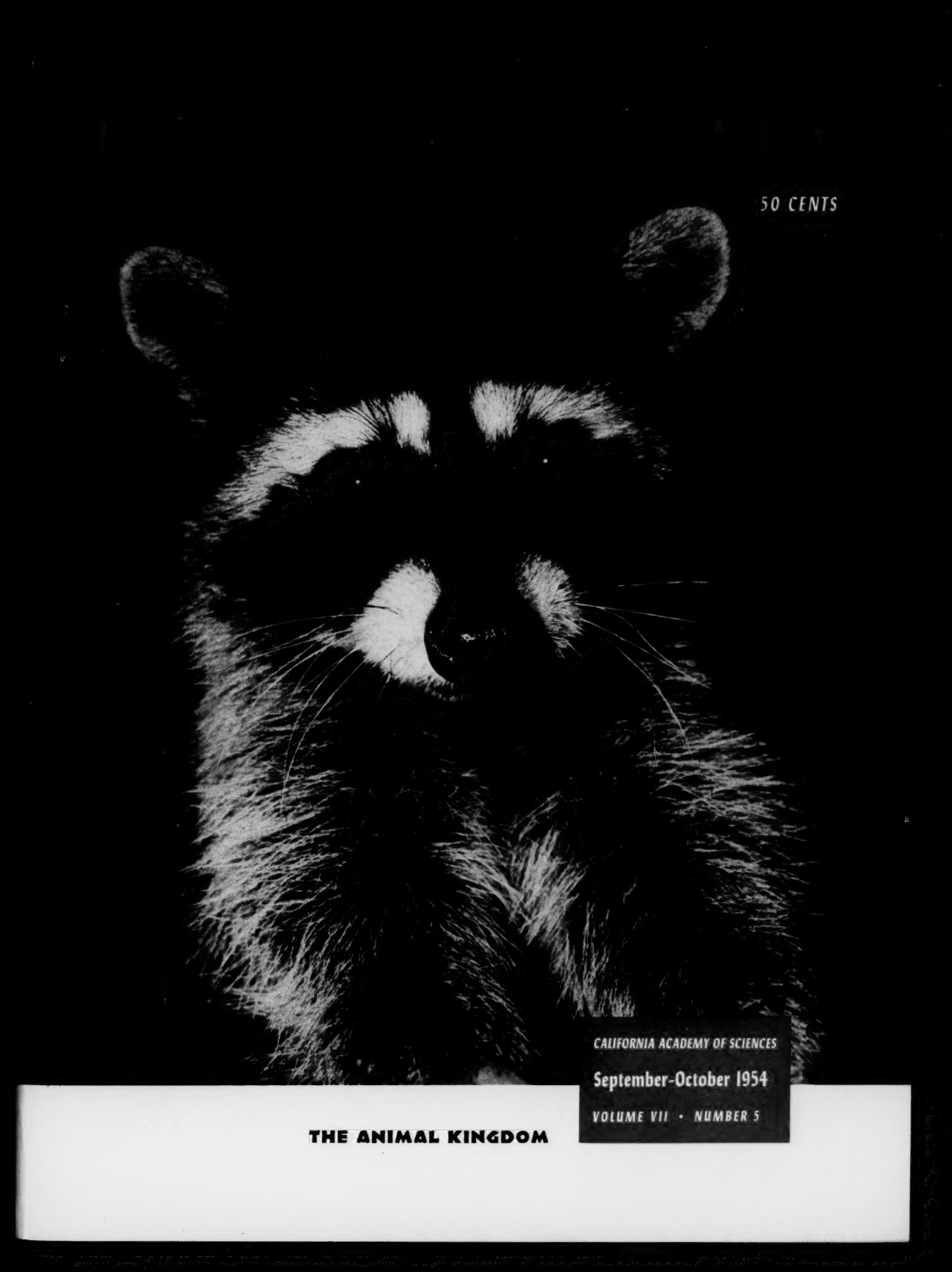

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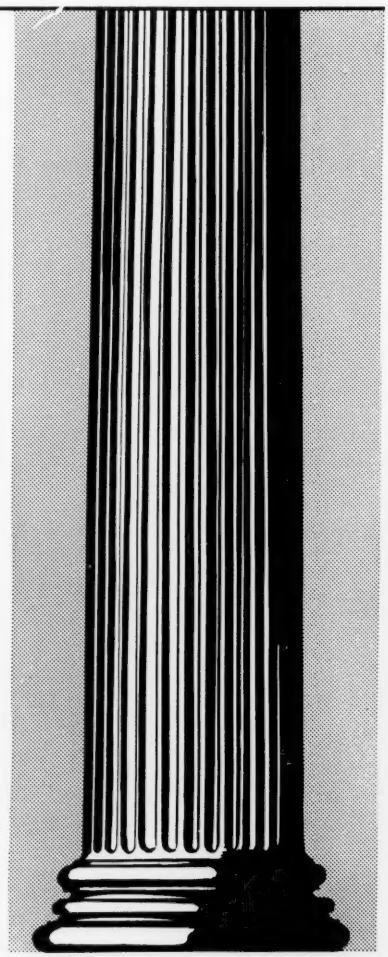

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1954

PRE-DISCOVERY

A SERVICE *Pacific Discovery* and other non-specialized science magazines may perform, directly or indirectly, is that of helping our science-bent younger readers choose careers. Such help is of course most useful when it comes before the fateful day on which a college major must be declared.

In our articles we can give glimpses of many fields, vignetting here or there the life of a botanist, zoölogist, oceanographer, conservationist, anthropologist, or archeologist. Or we can pass on an occasional hint through a book or other publication that comes to our notice. A case in point is the following item, which came substantially as given here, postmarked Athens, Greece, and signed by Gladys Weinberg, editor of *Archaeology*, quarterly of the Archaeological Institute of America (Mrs. Weinberg spent the summer at the American School of Classical Studies):

"The Winter 1954 issue of *Archaeology* will carry an article, 'Archaeology as a Career,' by John H. Rowe, associate professor of anthropology in the University of California. In it Professor Rowe describes in detail the education and preparatory work desirable for a young man or woman considering an archaeological career, the various kinds of posts available, and the rewards, financial and otherwise, that may be expected. The article will be illustrated and will include a brief bibliography of useful reading material. Reprints will be available either singly or in bulk. Any institution or person wishing 50 copies or more should order in advance of publication, from The Editor, *Archaeology*, 211 Jesse Hall, University of Missouri, Columbia, Mo. Prices are at cost — 50 copies, $3; 100 copies, $5; postage extra. Requests for fewer than 50 copies should be addressed, *after January 1, 1955*, to Business Manager, *Archaeology*, Andover Hall, Cambridge 38, Mass."

Not having seen Professor Rowe's bibliography, we can't say whether it includes a book we mentioned editorially a year ago this issue as in press — *Beginning in Archaeology* by Kathleen M. Kenyon (Praeger, New York, 1953; revised edition; 217 pp., illus., $4.00). This clear, concise survey of the field of archeology as seen from Britain, could be unhesitatingly recommended to American students even without the new edition's sections on American archeology by Saul S. and Gladys D. Weinberg. Professor Rowe, Miss Kenyon, and the Weinbergs may answer the $64 question for many an undergraduate on that fateful threshold.

DISCOVERING PD'S AUTHORS

PHOTOGRAPHER **John L. Blackford** sells insurance in Libby, Montana, when not stalking wildlife through the Western states. . . . ¶Besides free-lancing with camera and pen, **Peyton Moncure** has served as photographer for the U. S. Forest Service, Region One, at Missoula, Montana. Many readers will remember his white bison and Yellowstone bears in former issues. . . . ¶**Ken Stott, Jr.**, general curator of the Zoological Society of San Diego, will be remembered for his delightful koalas on and in the July-August 1952 *PD*. . . . ¶**Dr. Edward S. Ross**, curator of insects at the California Academy of Sciences, took time out from photographing *Insects Close Up* to "shoot" some of the larger visitors to his Marin home. He had hoped for a group shot on one of the occasions when the skunks mix it up with the raccoons. Perhaps the time has not been ripe, or possibly too ripe. **Dr. Robert T. Orr** has furnished information that may be generally applied to raccoons outside the home. . . . ¶**Fran Hubbard** writes from Yosemite where her husband is a Park Service ranger. . . . ¶**Dr. Harold C. Bradley**, University of Wisconsin professor emeritus of physiological chemistry, conservation writer and lecturer of Berkeley, wrote on the Tioga Road in our January-February 1950 issue. . . . ¶A Doctor of Jurisprudence, **W. I. Follett** here takes on a strange case in his capacity of curator of fishes at the Academy. . . . ¶**Leon E. Salanave**, associate curator of astronomy, barely made it back from eclipse-watching in Sweden in time to get his story into print. His film came by water, with Koster's fog still showing. D.G.K.

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THE COVER COPY

Far from bashful! This raccoon and his sisters and his cousins and his aunts regularly enjoy the hospitality of photographer Edward S. Ross and family.

PACIFIC DISCOVERY is published bimonthly at Gillick Press by the California Academy of Sciences. Publication office: 2057 Center Street, Berkeley 4. Editorial and Advertising offices: Golden Gate Park, San Francisco 18. Subscriptions: $3 per year; single copies: 50c. Members of the Academy subscribe through their dues. Entered as second-class matter, February 17, 1948, at the Post Office, Berkeley 4. California, under the act of August 24, 1912.

Who Triumphs Tomorrow?

PLATO, 2,000 years ago, clearly saw how deforestation and the consequent erosion and water wastage hastened the end of cultural greatness in Greece. With the *Essay on the Principle of Population,* Malthus in 1798 lighted the fire for one of the hottest of modern controversies, now raging between the so-called neo-Malthusians and all who decry the utter pessimism over man's future that Malthus' disciples fall into when reading world population trend tea leaves. Erosion's "grapes of wrath" became a terrible and dramatic reality in the Dust Bowl days to many Americans who possibly had never heard of Plato. Most of us had not known of Malthus until our mid-century population upswing jolted us awake after World War II. From now on man's problem of feeding his growing numbers upon the resources of a shrinking earth will become the ever increasing concern of all men.

Only technical men can solve large-scale, long-range technical problems – best use of land, new sources of power, substitutes for used-up iron or copper, food without soil – but behind the experts must stand an informed society. In our present state of knowledge, and for a long time to come, every technical proposal will be open to debate – in free societies at least – and every man will have the duty to know what mankind faces, with the right to a voice in crucial decisions. First we must get the facts, together with informed interpretation and the best available wisdom bearing on possible ways out of our fix. No light Sunday reading, this.

"Well," you say. "So I read a book a few years ago, well known authority – said we have nothing to worry about." ("Beyond any possible doubt, Mother Earth can provide food enough and to spare so that, in this age of science and far along our vista of untold millenia to come, every member of the worldwide human family may be adequately nourished. . . . The gloomy prediction of Malthus does not now apply and, if present trends continue, never will apply to man." – Kirtley F. Mather, *Enough and to Spare,* 1944, p. 69.) – Or: "One of those neo-Malthusians I read recently–frightened me to death!" ("Unless . . . man adjusts his way of living, in its fullest sense, to the imperatives imposed by the *limited* resources of his environment – we may as well give up all hope of continuing civilized life. Like Gadarene swine, we shall rush down a war-torn slope to a barbarian existence in the blackened rubble." – William Vogt, *Road to Survival,* 1948, p. 288.) And Fairfield Osborn, it will be recalled, had just viewed things with only somewhat less alarm in *Our Plundered Planet* (1948).

All right, so the experts disagree. Of course! but in what? in the degree or in the urgency of the problem or in some proposals for solving it – thus, experts will always disagree. *Enough and to Spare* is plainly not neo-Malthusian; but Dr. Mather says also that to make the most significant test of Malthus as applied to the modern world, "we must investigate the ability of scientific research and techniques so to change the relation between man and his environment as to provide a balance between supply and demand for an unlimited time in the future" *(op. cit.,* p. 13) – no contradiction, but the *if* on which our earlier quote hinges. It is for us to read the Mathers, Osborns, Vogts, and others, because the very heart of the hard core of agreement among them is that the greatest immediate need is widespread recognition and comprehension of the problem they are urgently laying before us.

Our Plundered Planet is perhaps the book that shot the controversy out into the public forum. Its call for man to "recognize the necessity of cooperating with nature" and "temper his demands (on) the living natural resources of this earth," is the challenge of a great naturalist, conservationist, and humanitarian to those who would put their faith in the technologists' capacity to guarantee an unlimited future through "artificial substitutes for natural subsistence." Now in *The Limits of the Earth* Fairfield Osborn takes a closer look at those natural resources, examining region by region their capacity to withstand and permit increasing population pressure, reëmphasizing our ultimate dependence upon them. He surveys "the possibilities of additional resources – the promise of science?" – warning that to put our hope in plankton, pond culture, Chlorella, and various experimental synthetics will not relieve science of its first task which is "to endeavor to fill the constantly widening gap between existing populations and their essential needs."

For Mr. Osborn the conclusion is inescapable; we can now see where lie the limits of earth's resources; we must equate resources with the number of people they can be expected to support; we must not increase beyond that number. *Some way must be found to limit our increase* from here on – or "the human race will enter into days of increasing trouble, conflict and darkness" brought on by widespread hunger.

Land is our chief limiter, the resource on which all else depends when it comes to reckoning our population potential. Here the knowledge and judgment of one who "is perhaps the world's leading authority on land use" have become accessible to all of us, with the book *Land For Tomorrow* by L. Dudley Stamp, professor of social geography in the London School of Economics.

It begins to look like a majority opinion. – "Again and again we see the wisdom, even the vital necessity, of Man's entering into alliance with Nature instead of regarding himself as freed by his inventions from natural laws," Professor Stamp declares at the outset. He proceeds thence into an analysis of world population estimates (best guess: 2,350,000,000 in 1950) and plots some trends. Next he surveys lands, food, and mineral resources, outlines what is being done to salvage the Old World and preserve the New, and finally

presents his own "Conclusions and Speculations." It seems to Stamp our best hope is to use our already worked temperate lands to their highest potential, as represented by the farms of England or Denmark – this rather than "to look for immediate development of tropical lands." The "great underdeveloped lands of the world as indicated by low outputs per acre must be held to include large parts of the United States, Canada, Argentina, and Australia." There must be "a willingness to foster both international population movements and international trade, that is, abolition of restrictions." Wholesale mechanized destruction of vast areas should be replaced by "balanced mixed farming" in small units. The kinder treatment of the land actually produces far more for man's use.

The land was well kept wherever the job was left to native grasses, shrubs, and trees. "Trees are necessary to our existence because they are the chief guardians of the soil, keeping it stable and watered." So John Stewart Collis opens his "Argument" for *The Triumph of the Tree.* He closes on this note: "Nature always has the last word. . . . We can do a great deal to upset the equilibrium, but the balance will always be eventually restored – at our expense. If we realize that we *could* work in with that equilibrium and be upheld in the arms of Nature, then we cannot fail to experience courage and hope."

Adjust, coöperate, ally, work, *with* nature! The chorus swells. (It would be unfair to Mr. Collis not to point out that, while there is the marrow of his book, too, it can be read – if you will – just for its ringing history of trees from their genesis to their worship, use, and abuse by man; it is also first-order natural history, in prismatic, often lyric prose. Above all, it is a profound analysis of man's relationship to the land.)

Hope? A leading geographer, recently director of the American Geographical Society, Dr. George H. T. Kimble, finds hope in "the strength of the earth," in "the resilience of society," and in "the perseverance of man" – to quote some chapter heads in his heartening book, *The Way of the World.*

Manhandled and abused as it is, the earth is still "fecund and fruitful, . . . still yields its increase in due season" and abundance. "Furthermore, it has shown a remarkable power for cushioning the blows and bluster of unruly men, for recovering from the buffeting of war, and for surviving the apathy of peace. It is a home that has outlived many inhabitants, a reservoir that has never yet run out of supplies." And Dr. Kimble shows us, through many pages, farmers of the Nile and Ganges raising "three separate and sizable crops on their irrigated fields" each year still, after (in the Nile, at least) 6,000 years of continuous cropping; he cites the luxuriance of the tropics, the promise of Uganda's copper, the reservoir of sub-Arctic forests, "the organic riches of the sea." On the human score, history is full of examples of human capacity to adapt, to change, to plug doggedly on toward distant goals. What he would have us see in all this is not a rosy dawn just for the wishing. He shows us the night of our own blindness as well: our withering "cult of the 'big' " – big cities eating the land, big dams, big bulldozers, big development schemes, – our fumbling ignorance, and worst, our insatiable, soul-destroying greed. "For when we get down to bedrock," Dr. Kimble concludes, "the biggest problems of our time are not physical or technical, but moral and spiritual." Violence, inequality, hatred, frustration will, he is convinced, yield in time to our unselfish pursuit of man's highest ethical and spiritual aspirations.

Coöperate with nature, limit our numbers, guard the land, live by the Golden Rule – human nature being what it is, what are the prospects? Harrison Brown, a professor of geochemistry at the California Institute of Technology with a considerable personal stake in the future – he's not yet 40 – has taken as intensive a long look ahead as a responsible scientist would dare in *The Challenge of Man's Future.* He begins with a sharp glance at man's biological emergence to see how he got where he stands at this particular mid-century. Next he takes half his book to survey our present situation with respect to world population vis-à-vis world resources – "food," "energy," "things." This section is packed with detail, a gold mine of facts. More people means more food means more industrialization – it goes on: more raw materials and energy sources used up. The earth can support this for a roughly calculable time at the present rate of human increase. It is not long. Where will it get us? "If we set strict limits (to activity, hence caloric intake) perhaps we could provide for 200 billion persons." But who, Dr. Brown asks, would want to be part of a "writhing mass of human beings" like maggots on a dead cow? The way to any future worth having *must* begin with the planned control of human increase and the abolition of war. Otherwise – most likely of his three possible "patterns of the future" – we will revert to a low-standard agrarian existence. With stabilization, no war, and the transition to use of low-grade resources the pattern that looms – his second most likely – is "the completely controlled, collectivized industrial society." Our third and best choice, "the worldwide free industrial society" in harmony with the natural environment, will call for "intelligence, imagination, courage, unselfish help, planning, and prodigious effort. . . . The time for decision is the present," if man's best would triumph tomorrow.

Much present hope, we believe, lies in the fact that these highly qualified men are giving their knowledge and the fruit of their thinking directly to the people. Hope will increase in proportion as they are read and taken to heart. D.G.K.

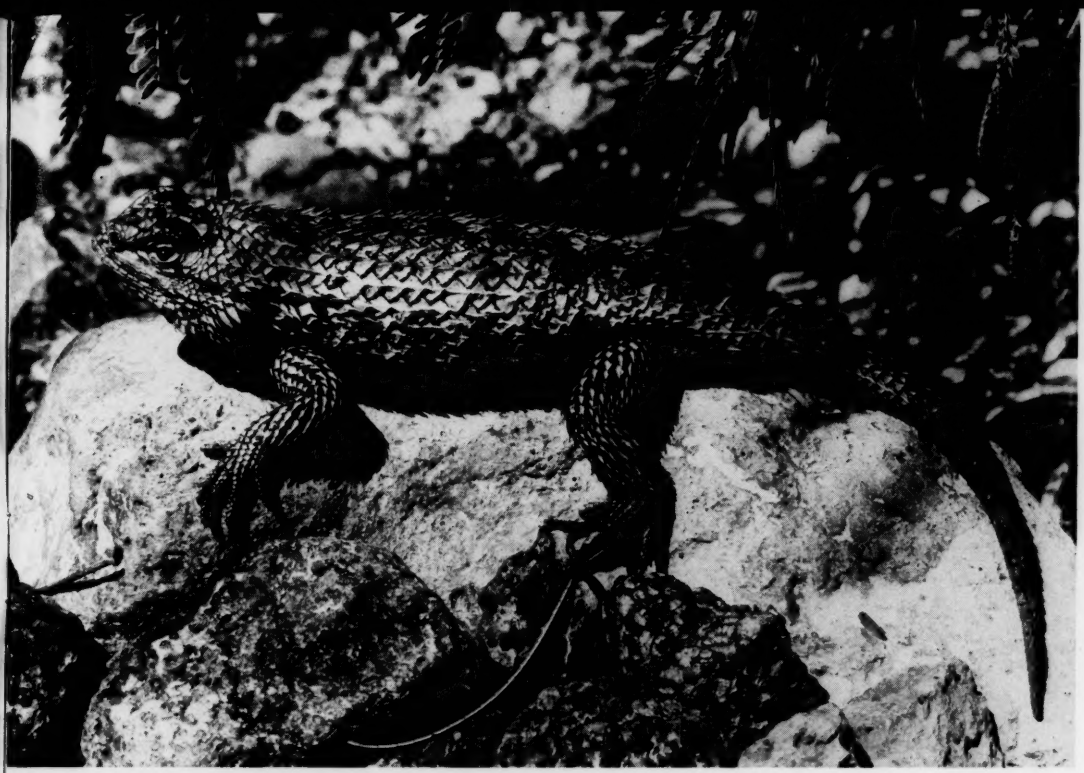
NOTE: Thanks are owing the authors and publishers whose books gave the substance of this essay. Data on the newer books cited will be found on page 31.

JOHN L. BLACKFORD

SPINE, SCALE & FANG

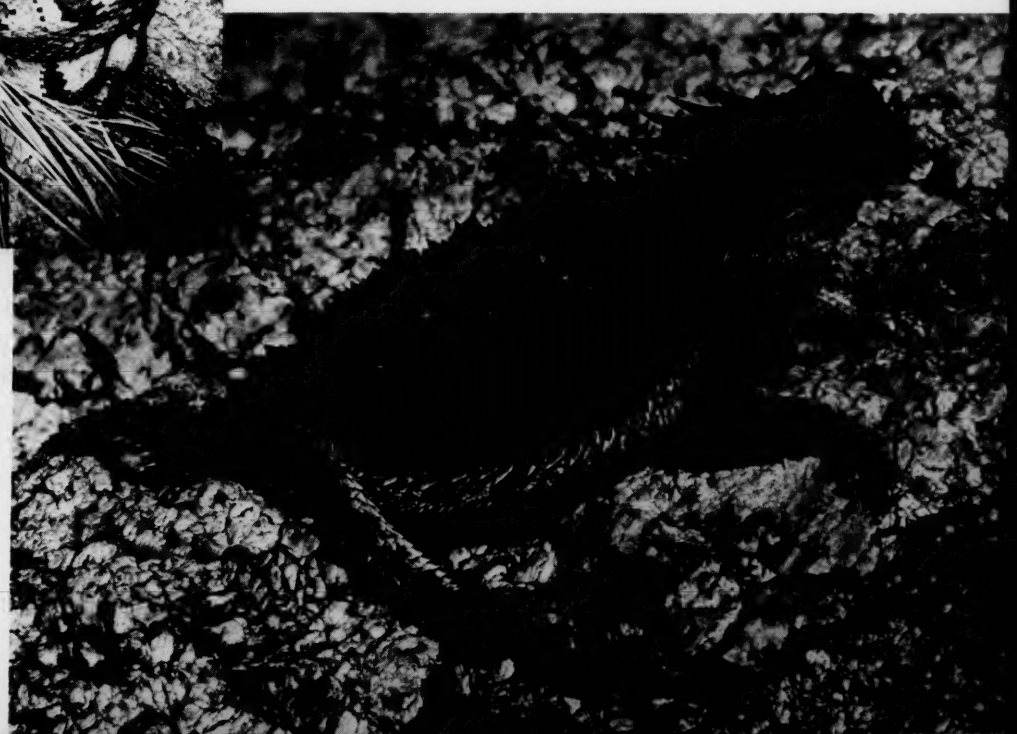
The deserts of our Southwest are among the world's unique natural areas. So rich are they in various forms of life that the word desert seems hardly fitting. Some parts, like the Hassayampa Desert of central Arizona *(below)*, are veritable forests of cactus and other plants, teeming with animal life of all sorts. Reptiles seem to fit the scene particularly well, with their dry horny plates or cactus-like spines.

➔ The desert tortoise *(Gopherus agassizii)* ranges over desert California (where it is protected by law), Nevada, Arizona, Utah, and Sonora. Its "worst enemy is stupid man" (Jaeger).



The desert spiny lizard *(Sceloporus magister magister)* has, in the male, a brilliant blue throat and a black collar. Closely related to the common fence lizard, it occurs chiefly in California's Colorado and Mohave deserts, although Paul Griswold Howes puts it among the reptiles of *The Giant Cactus Forest and its World* (see this beautiful new book for a detailed ecological study of the saguaro desert areas of Arizona). (Natural size.)

← Less aggressive than some species, the green rock rattlesnake found in the Chiricahua mountain region of southeastern Arizona relies a good deal on his lichen-green camouflage with its weathered black splotches for protection. Abundant in certain rocky parts of the yellow pine zone, this desert mountain species may be more of a danger than some others because one is less likely to see the rattler first, especially when reaching up to a rock ledge without looking — bad practice in any rattlesnake country!



→ The regal horned lizard *(Phrynosoma solare)* may be found quite commonly where the giant saguaro grows, in southern Arizona. The color of its back runs from ocher yellow to grayish, darker on the sides. The underside is white or yellowish white with many small black spots. Active in the warm hours, it goes beneath the sand when evening coolness comes. (Natural size.)

"BEACHCOMBING" in the P[illegible]s

Amateur limnologist Moncure with collecting jars, "beachcombing" the marshy shore of Nine Pipes Lake, a waterfowl refuge forty miles from Missoula, Montana. (Photos by the author if not otherwise credited)

PEYTON MONCURE

I HAVE no south sea lagoons, no coral reefs or ocean tide pools. I have no tropic beaches with their wealth of littoral life, nor do I have volcanic islets, the homes of exotic sea birds, for my beachcombing.

So I am a "marshcomber" – limnologist if you want to be technical – making the most of what I have at hand, as happy in my marshes and lakes as any globe-trotting zoölogist is on his South Pacific shores. And I love these small, inland bodies of water just as much as any Polynesian skipper does his atolls beneath the Southern Cross.

A lot depends on how one approaches a subject. To many people, Nine Pipes, Kicking Horse, and Pablo are just isolated, marshy lakes out on the prairie. Seeley, Mission, and Flathead lakes are, to many people, mere mountain lakes lying on the east and west sides of Montana's Mission Range, all having picnic grounds here and there along their pine-clad shores, nice places to picnic or camp. To the naturalist, amateur like me or professional, there is more meaning to all of this.

I know that whenever I go "marshcombing" on Nine Pipes, Pablo, or Kicking Horse, I'll have them all to myself because nature study as an avocation in this part of the country is, to put it mildly, quite unusual; and the "practical" people don't bother around these treeless bodies of tepid water. Even the matter-of-fact Flathead Indians on whose reservation these marshes lie don't bother to fish for the bass, mud cat, perch, and sun fish. I can imagine myself a lone castaway on wild shores near teeming waters.

The road to forsaken, marshy Nine Pipes (named after a Flathead Indian chief) is rough with deep ruts of hard clay. But I am soon there and into swimming trunks, equipped with my cameras, binoculars, and collecting jars. I have not brought my canoe today as Nine Pipes – like Pablo– is a Federal waterfowl refuge and no craft is allowed on its waters.

Today I'm collecting water samples to take home to my laboratory. There, under the microscope, I'll study and photograph the wealth of animal life I have collected in my jars. And on my lab shelf I'll place these jars along with the

other water cultures I have there, all carefully labeled as to source or location, type of culture, and date collected.

I am also on the lookout for anything else that might delight the nature lover's heart. My 35 mm. camera is loaded with color film, my Graflex with black-and-white – there is the variety of bird life, the beauty of the snow-capped mountain backdrop.

Then there is always the possibility of discovering new bird visitors. Today, though only another of many days on Nine Pipes similar to it, is yet different and full of possibilities.

As I walk past a pothole a muskrat is swimming across the pond, oblivious to my presence in typical muskrat fashion, carrying a long reed in its mouth. It seems as though every pothole has its muskrat family and its one or two mud hens.

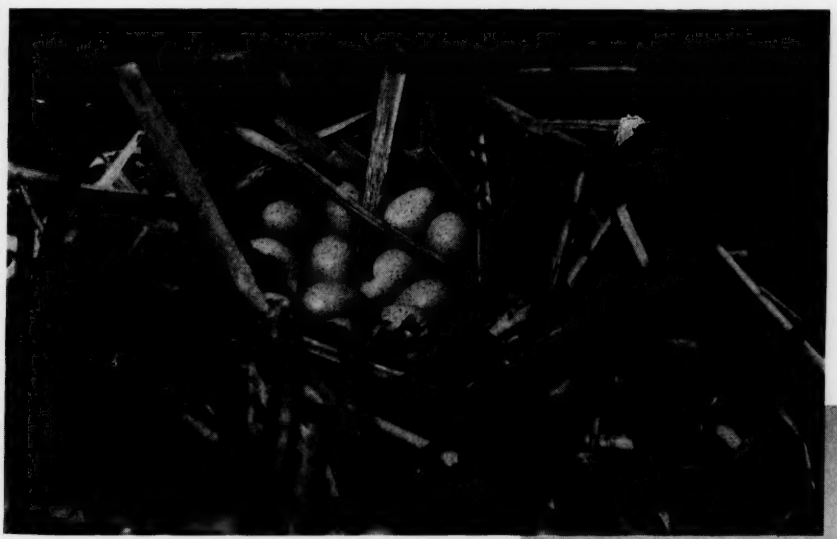
On the grassy flats the kildeer try to lead me away with their broken-winged, broken-legged ruse, shrilling their wild cries insistently. Invisible in the dense cattails around another tiny pond the red-winged blackbirds chatter and scold.

The grass stubble on the dried lake bottom is hard on bare feet, so mocassins feel good; but when I reach the main shore I can plod the shallows with the restful feel of mud oozing up between my toes and water about my ankles.

The great flocks of wild ducks and Canada geese gobble and honk on unmolested mud flats, points, and bays. For the most part, the ducks are mallards, although I notice tiny, fleet-winged teal rising, too.

Through my glasses I can distinguish shovelers and pintails, some with only their rumps sticking out of the water as they submerge the entire fore part of their bodies while feeding in the ooze and mud beneath the shallow water, And oddly enough for this treeless body of water, there are golden-eyes here.

The communities of mud hens, loath to leave the water, skitter swiftly away in raftlike assemblies for a short distance as I approach with my camera. I believe their reluctance to fly is due to their awkwardness in air combined with their apparent devil-may-care attitude toward intruders – they



The floating nest of the pied-billed grebe is constructed so that it rises and falls automatically with the water level, while at the same time it is securely anchored to the growing reeds surrounding it. This nest was about 50 feet offshore; I had to wade out to a depth of four feet to get the picture. The parent grebes swam around quietly 25 feet away while I worked. Nest and eggs were dry and warm.

Cattails are sparse in the main body of Nine Pipes, but crowd into every pothole in the area and ring every pond densely.

Seeley's marshy fringes, heavy with sedge and water lily, have yielded everything from giant large-mouth bass to the simplest protozoa.

continue their gossipy clucking and cooing even after the ducks have been scared away.

On an isolated mud bar, standing still as a statue, is a sandhill crane, largest bird in these marshlands. He is wary to an extreme; and when I come within about 100 yards of him he takes off, flapping slowly into the air with dismal trumpeting noises.

The avocets seem nonchalant about my presence, to a certain degree, and continue their restless search for food, sometimes running along the shore scooping up insects in their long, flattened bills, or wading in the shallows, their stiltlike legs keeping them well above the water. Their large, white-plumaged bodies with black wings are quite conspicuous against the mud and water; and this lack of protective coloration, combined with the eating quality of their flesh, has, in some states, made them a favorite target of gunners, who know the bird as blue shanks.

Upon my too close approach, however – about 50 yards – the avocets take off, emitting occasional screams, and fly over my head a couple of times quite close as if examining this mud-bound intruder.

The little plovers standing around near the edge of the water, some on one leg, others picking around in the mud, remind me of small children. Their clear whistling voices heighten the picture.

Sometimes while wading through the shallows I come across platforms of green, matted vegetation concealed among the "oases" of big bulrushes which I recognize as deserted nests of grebes. These nests are anchored just above waterline within the clumps of rushes and attached to the individual growing stalks.

Grebes are well represented on Nine Pipes and environs, as the pied-billed, western, and eared are all frequently seen. Because of certain similarities between grebes and loons, I used to be confused, many years ago, over which was which, until I took my ornithology a little more seriously. I subsequently found out that the loons had forsaken the lower lakes for the secluded lakes high up in the Mission Range. (Until recently, a pair of loons had been making their home on Seeley Lake long after the others had left, but high-power speed boats finally drove them off.)

Today I've wandered down where the rocks and boulders form the dam. There the water is comparatively deep, encroaching upon the rocks and forming a maze of underwater grottos and caves which a variety of tiny tenants call "home."

The most interesting of these are the spry little

***Cyclops* is a genus of minute crustaceans, the species ranging from 0.6 to 3.0 mm. long (about 1/32 to 1/8 inch). They are found the world over.**

A swarm of hydras, like acrobats doing handsprings and cartwheels. (Courtesy General Biological Supply House, Chicago)

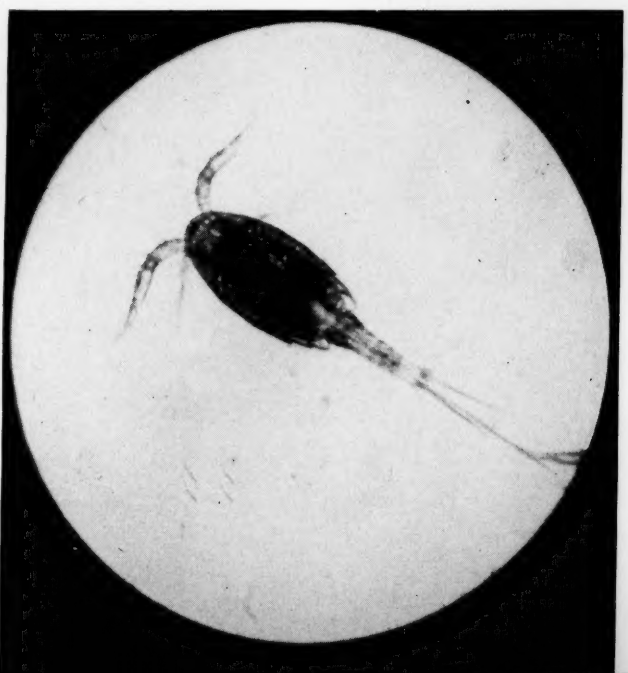
crayfish that scuttle out of sight as soon as I remove the rocks covering the cracks. A family of tiny water snakes slither in and out among the rocks above the waterline as I pick my way along. Large green frogs jump into the water here and there upon my approach, perhaps into the jaws of the five-pound large-mouth bass that loiter in the dense growths of *Anacharis* (*Elodea*) just offshore.

This plankton-like vegetation lines the lower reaches of the lake, particularly along the rocks, and extends about ten feet out into the water and to a depth of two or three feet. And, like the lacunal wall of rocks, these masses of water weed repay my searching.

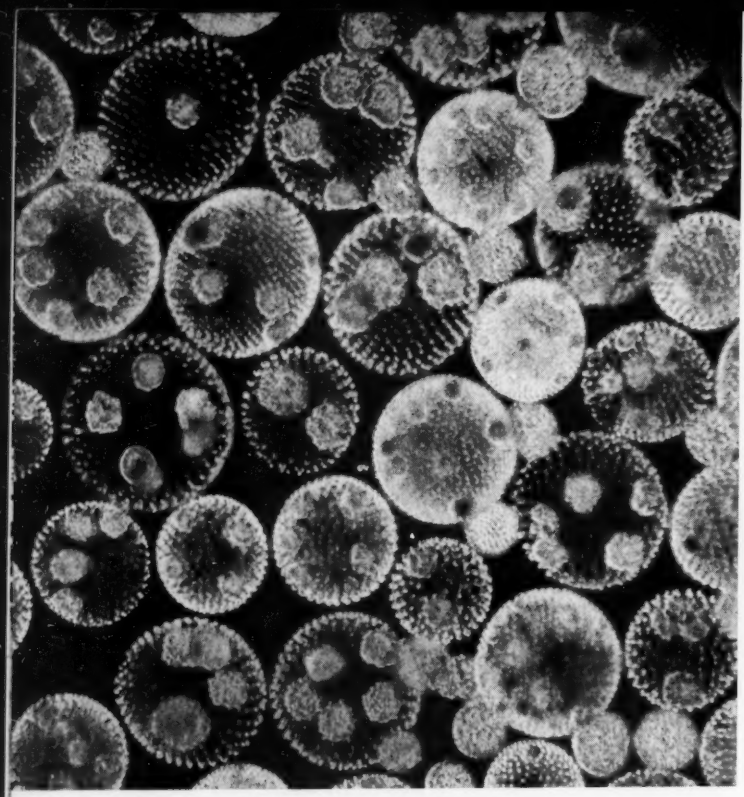
Wading into this miniature Sargasso Sea a number of times I drag to shore great armfuls of the weed to see what finds sanctuary there. Showers of tiny minnows sparkle in the sun as they jump about on the piles of vivid green *Anacharis*. Most are perch; others minute sun fish and bass. With them, flopping about, are fewer tiny mud catfish, jet black except for white bellies. These whiskered creatures, about an inch-and-a-half long, are, like the entire catfish family, extremely tenacious of life; so I place some in a jar to take home with me to be used as scavengers for home aquariums.

A few other creatures which come along with the armfuls of *Anacharis,* and plainly visible to the naked eye, are diving beetles, back swimmers, water boatmen, snails, mosquito wrigglers, and other larvae.

The hours have slipped by like minutes, and by this time I have filled several of my collecting jars; one with warmish water containing brilliant green, bubble-filled pond scum from the surface of the water (the algae contain the most varied and interesting forms of microscopic life); another jar with surface water from a pothole, putting in some of the vegetable matter about the stalks of the cattails, as well as some decayed leaves. Another jar contains surface film scooped off the top, with some living plants and grasses. And into a jar of *Anacharis* and neighboring pondweeds (*Potamogeton*) I toss a few water insects, snails, larvae, etc., to round out my collection.



A *Hydra,* a tiny polyp belonging to the class of the jellyfishes and sea anemones, reproduces by the budding off of one from the stalk of another. When the new one is developed it separates from the parent and establishes itself solitarily.



***Volvox* is a large colonial flagellate protozoan (×100). (Courtesy General Biological Supply House, Chicago)**

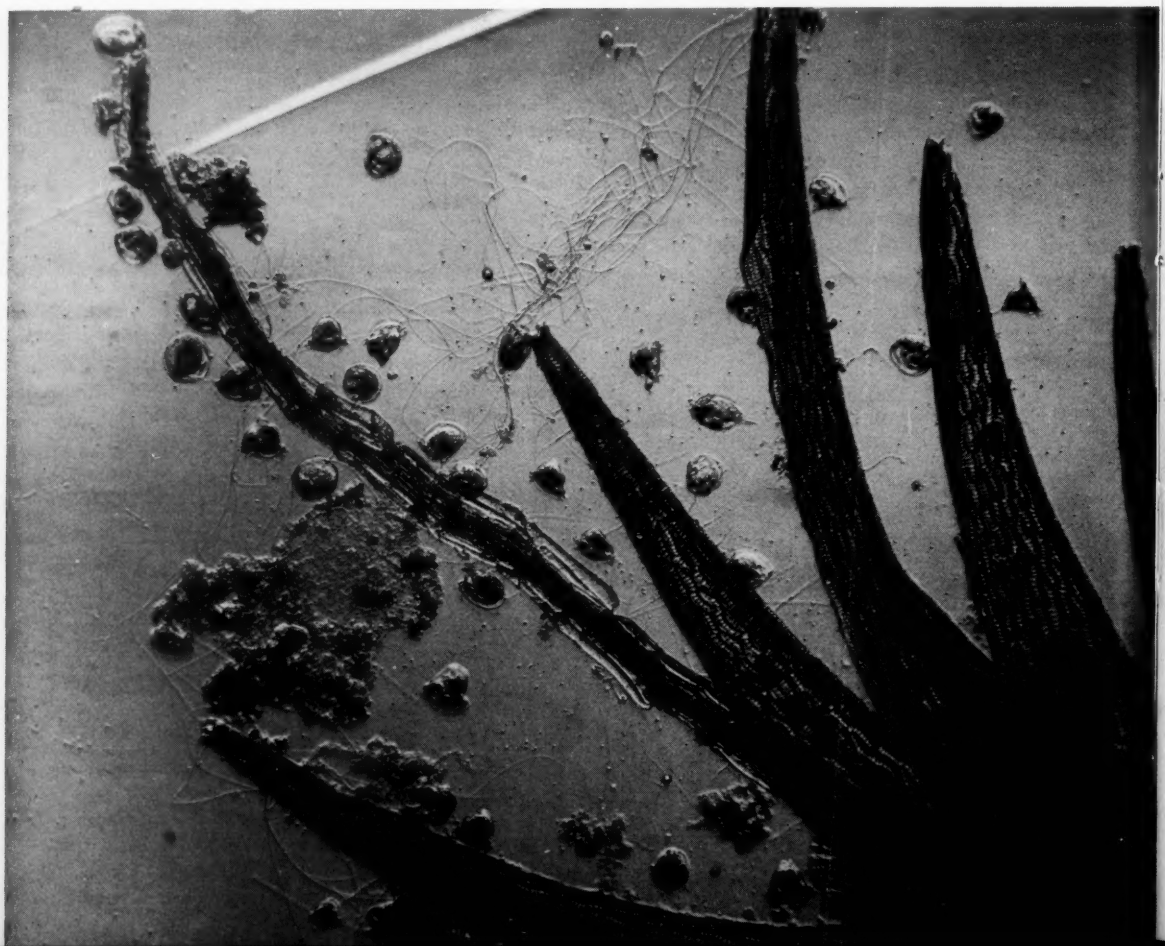
Through the walls of the jars I can see that the water is alive. Already, with my pocket lens, I can see *Cyclops* dashing about, and hydras attached to the glass walls of a jar. There are a number of tiny, snakelike worms threshing about in the algae; and nymphs and larvae.

Water samples from Nine Pipes have always proved extremely interesting and varied, owing, in some measure perhaps, to the migratory waterfowl. For instance, while I once was "screening" a drop of water under the 100-power lens of my microscope I came across the carcass of a snakelike slug or planarian-type animal which was being devoured by a horde of paramecia. The scene was strangely similar to one I witnessed when as a child I saw some boys drop a giant tobacco worm upon an anthill while the death-dealing ants swarmed over its helpless, writhing hulk.

On another of my low-power-lens explorations I came across the body of a *Cyclops* containing several paramecia which had effectively reduced the copepod to a transparent shell. Perhaps the most beautiful sight I've come across under the lens was my first *Volvox* rolling noiselessly by in solitary dignity like a giant glass-encrusted ball . . .

But to get back to Nine Pipes . . .

***Vorticella*, "solitary but often gregarious" (Pennak), attaches itself to plants by long threads (×85). The animals run 35-160 microns long. (Courtesy General Biological Supply Souse, Chicago)**



A semi-transparent amoeboid worm with the large nuclei plainly visible. (Author)

→ Paramecia, like slippers, and rotifers ("wheel-bearers") — common protozoans (×100). (General Biological Supply House)

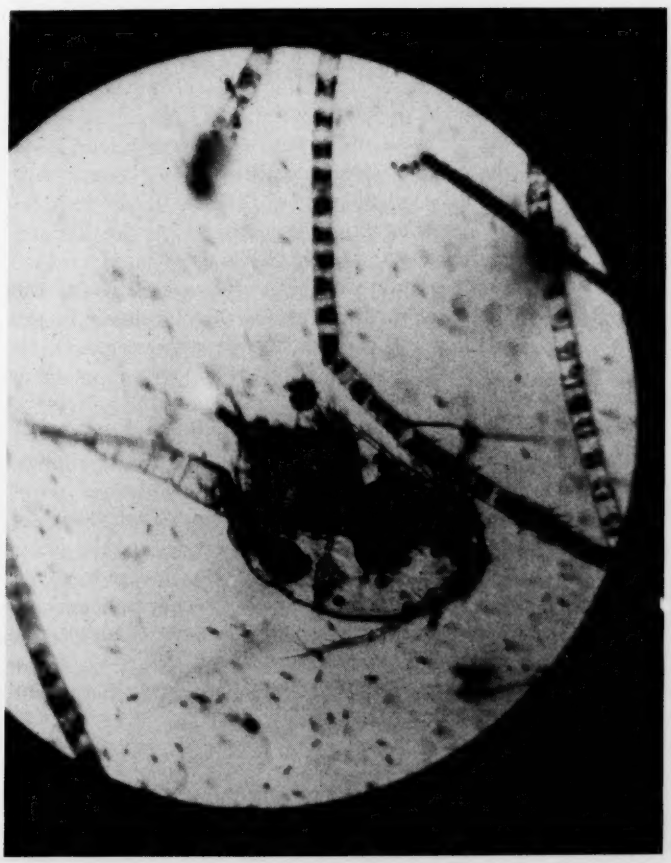
The rest of the day is spent in varied ways.

With my camera set up on a tripod, I wait for the right cloud formation to present itself, then I am able to get a few colored shots of the snow-capped Mission Range reflected, along with fleecy clouds, in the mirroring waters, perhaps with ducks flying overhead, or with a raft of coots in the foreground.

Some times of the day I merely loaf — that's the beachcomber's prerogative, you know—by swimming from islet to islet, or by acquiring a deeper shade of suntan as I lie on the warm beaches with the brilliantly colored turtles, watching the gulls hovering about, and listening for the music of pinions cutting the air as mallards come and go. The marshy tang of guano, decomposing flora and fauna, and sunbaked mud which fills the air is, to many people, smelly and offensive; to me (beachcombers and scientists are odd, of course), it's fascinating . . . at least for a day at a time.

The expressions on the face of the Nine Pipes marshlands change like the face of a vivacious and sensitive young woman.

In the dawn there are somber pastels, water-mirrored; a quacking, croaking, shrilling, honking of bird voices swelling from out in the water expanses; and a liquid trilling of bird voices ris-



Carcass of *Cyclops*, with animalcules feeding inside visible through the transparent body wall (×90).

ing ardently from out of every little cattail-lined pothole, all welcoming the coming sun.

In the middle of the day everything sleeps and dozes, from the bass under the lily pads to the painted tortoises of every size scattered here and there along the steaming mud flats in a happy coma.

In the evening the countenance of the marshes is something else again. Living things are again living, in a lonely sort of way; the crayfish come peeking out of their rocky chambers in the dam for their nocturnal forays. The frog chorus rises and falls in waves. The nighthawks, or bull-bats, zigzag overhead erratically, calling out regularly in rasping voices: "*Beeeerd . . . beeeerd . . . beeeerd,*" then zooming with a roar of pinions into a swarm of insects.

Nights spent at Nine Pipes are wonderful beyond mere telling, and sleep comes slowly as one lies in a sleeping bag beneath mosquito netting. The blackness of night pulsates with sounds and scents; the unseen marshes are felt in every tingling nerve. Alone . . . and yet not alone, I am surrounded with countless millions of living things, crawling, swimming, flying.

Then comes a time of the year when living things sleep.

It is on these wintry days or evenings at home that I go upstairs to my lab and "get acquainted" with the more insignificant denizens of Nine Pipes – the minute animal beings that are teeming in those jars of water on the shelf.

Under the microscope's 100-power lens I see the polyp *Hydra*, like a diminutive octopus, with tentacles which expand to great, snaky lengths, and contract practically into the round ball of the body. He is the terror of this tiny water world.

Some tiny wormlike creatures, such as the thread-worms and naiads, barely visible to the naked eye, become great transparent snakes whose internal organs can be observed functioning clearly.

In an out among the strands of algae dash tinier creatures, the one-celled *Paramecium*, or slipper-animalcules, so-named because of their cigar- or slipper-shaped body wall. Under 200 or 300 power one can see cilia around the edges of the body, tiny hairs whose constant motion sweeps food into the body opening. Often I come across dense concentrations of these animals, very much like the swarming of bees.

Other one-celled animalcules are often found in green algae – *Vorticella*, or colonial protozoa, so-named because of each animal's being held to the colony by a single threadlike strand or "tether" which, in coil-spring fashion, jerks the animal back if it wanders too far away.

It is hard to keep *Cyclops* in the field of view because of its vivacity. With its two "paddles" the copepod propels itself in jerky dashes. But if you can get one to stay quiet for a second you can see the vital organs functioning within its transparent body wall. It somewhat resembles a crayfish in miniature.

A couple of other types of entomostracans of size similar to *Cyclops* are often found in the same water specimen. These are *Cypris*, a bivalved animal with four protruding legs and two antennae; and *Daphnia*, another shell-covered cladoceran with a sharp, stiff tail, and branched front paddles with which it sporadically threshes the water. (This water flea is an important commercial item as food for tropical aquarium fish.)

These are but a very few of the creatures that I meet in my microscope journeys.

I am constantly running across such things as amoeboid worms, sluglike creatures that virtually "pour" themselves forward; animals that look like two or three links of sausages sliding along, the granular protoplasm shifting visibly within them, but with no visible internal organs – just mysterious protoplasm pouring back and forth like sand in a bottle.

Many of these beings I cannot name, as yet, but that makes it all the more interesting. I cannot tell what is coming to my lens next; there seems to be no limit to the unbelievable life at home in my jars.

Furthermore, these jars of water cultures, if tended and replenished, will furnish me with many a winter evening of fascinating fun. While snow and ice cover Nine Pipes, and zero winds blow outside the house, I have a bit of the marshes and summertime in those jars in my lab to tide me over till spring, and keep my roaming mind off tropical lagoons, exotic shores, and equatorial jungles.

Books for Limnologists:

MORGAN, ANN HAVEN. *Field Book of Ponds and Streams: An Introduction to the Life of Fresh Water.* G. P. Putnam's Sons, New York. 1930. The ideal book to take with you; includes fishes, amphibians, reptiles, plants.

PENNAK, ROBERT W. *Fresh-Water Invertebrates of the United States.* The Ronald Press Company, New York. 1953. (See Reviews, page 30, this issue.)

KEN STOTT, JR.

MONKEY ON THE MENU

"Keep your distance — or else!" is the attitude here expressed by the monkey-eating eagle in the San Diego zoo. (Courtesy Zoological Society of San Diego)

THE MONKEY-EATING EAGLE of the Philippines is perhaps the most impressive predatory bird on earth and, as such, should have been known for centuries. To begin with, it is very large and uniquely crested, either feature in itself being enough to make the bird conspicuous. Furthermore, it is fairly numerous in certain parts of its range, and its haunts have been known to the western world since 1521. Yet despite these factors, the species was not scientifically reported until more than three hundred and seventy-five years after Magellan first set foot on Mindanao, one of the islands upon which the monkey-eater has since been recorded. Like the okapi, the Cambodian giant ox, the giant forest hog, and the Congo peacock, this great eagle was a latecomer into scientific circles.

The type specimen, now in the British Museum, is a bird collected by Whitehead on the island of Samar and described for posterity as *Pithecophaga jefferyi* by Ogilvie-Grant in 1896, a new genus as well as a new species.* In his writings Ogilvie-Grant noted the eagle's spreading crest, the rich brown plumage of its back and wings, and the creamy white underparts with the reddish brown shaft-stripes on the flanks. He also called attention to its enormous yellow feet and black talons. But most of all, he seemed impressed by its beak: "The depth of the bill is greater than that of any known bird of prey, except Pallas's Sea-Eagle . . ., while such extreme narrowness, compared with the depth, is quite unique among birds of this order" (*Ibis*, 1897).

Following its discovery on Samar, the eagle was later recorded on Mindanao, Luzon, and Leyte (in all likelihood it occurs on others of the Philippines as well), and such reports eventually found their way into print. But between the publication of Ogilvie-Grant's original descriptions and the present time, little material of a substantial nature concerning the habits of the bird has come to light. The life history of the monkey-eating eagle remains a mystery to this day.

The very temperament of the bird and the treacherous character of its natural surroundings almost preclude any attempt to investigate its day-to-day activities. From captive specimens (these have been few) we have learned that it is a shy, somewhat moody bird, and not given to expressing itself with the ear-splitting vociferations that are typical of many of its relatives. In the wild, such retiring and taciturn tendencies aid it in escaping unwanted attention — both that of mankind and that of its prospective prey. It inhabits the densest, wildest virgin forests, many of which lie within areas that are still marked "unexplored"

*There are two specimens in the collections of the California Academy of Sciences.—Ed.

on maps. While the Negritos and other mountain tribes may know it well, it is seldom seen by white men, for they and it do not thrive in the same environment. Philippine jungles are as formidable as any in the world.

Natural history texts, when discussing the bird, usually dismiss its habits with some misty reference to its diet: "The monkey-eating eagle apparently eats monkeys and other mammals, perhaps domestic fowl." A reader finds such unavoidable vagueness annoying, but to a zoo it can be downright frustrating.

In 1938 a fully mature female monkey-eating eagle was obtained by the San Diego Zoo. It was the first living specimen to enter the New World and only the second to be exhibited in a zoo anywhere, the first having been shown in London around 1908. The problem of feeding the bird offered considerable challenge since the only specific reference to any of its natural dietary preferences concerned long-tailed macaques. While long-tails are more easily obtainable than most other Old World monkeys, they could scarcely be provided in sufficient quantity to maintain a bird as large as a bald eagle. Freshly killed guinea-pigs and junglefowl were proffered and disdainfully rejected, and a host of other substitutes proved unacceptable. The food which finally broke down the monkey-eater's resistance was, of all things, salted hamburger!

The adult female specimen survived for only a few months. Apparently, the chances of teaching an old monkey-eater new tricks are negligible. But with a young male specimen now in the collection it has been an entirely different matter. He has shown himself to be gratifyingly adaptable and seems to be content with fare that is somewhat more expendable than monkeys imported from his native land. The current specimen is only about two-thirds the size of his predecessor, but such a sex difference in dimensions is not unusual. Where hawks are concerned, "females are larger" might well be propounded as a rule of thumb.

During World War II, I had occasion to spend a number of months in the Philippines, among them three on Samar and an equal period on Mindanao — both islands upon which the eagle has been collected. Most of my time was spent in the field collecting water samples, noxious insects, and what have you — and unofficially keeping a weather eye open for the furred and feathered inhabitants of the region. Although much of the country I "invaded" was suited to the monkey-eater's mode of life, I saw the bird only once, and that happy encounter occurred on Mindanao.

The Tumaga River forest lies a few miles inland on the Zamboanga Peninsula, and it is typical of the eagle's habitat. It teems with life, yet it is somehow sepulchral. From its dank, molding carpet up through the tangle of rattan palms and spiraled lianas to the spreading green canopy far above, the forest has a strongly funereal quality about it. Even the ochre light that penetrates its humid depths is filtered and diffused — the same sort of illumination that characterizes an undertaker's parlor.

Monkey troops steal softly along the forest floor conversing in hushed voices and flying lemurs soar silently like air-borne ghosts from tree to tree. Parrot calls and the trumpeting of feeding hornbills drift downwards from the sunny surface of the forest roof, becoming muted and devitalized as they descend.

I was crossing the Tumaga River when suddenly the native guide pointed to the narrow slit of sky overhead, an irregular band of blue which followed the river's wandering course. There, crossing the opening was a monkey-eating eagle.

The buffy plumage of "his" belly caught and reflected the sun and, when viewed through binoculars, the reddish stripes on his thighs were plainly visible. His feet and great curving talons were folded tightly against his body like the landing gear of a plane in flight. Even from below, his filmy crest was conspicuous as it rose and fell slightly with each wingbeat. But most noteworthy of all was the form of the bird, so starkly etched against the sky.

The tail was long and narrow, and the broad rounded wings seemed short for so large a bird. Abbreviated wing length, however, is common with forest birds; their habitat requires the utmost in compactness and maneuverability. The flight of the monkey-eater has been described as that of a giant goshawk and, as such comparisons go, it is a good one. Each wing-stroke of the bird I saw was heavy and deliberate, and the general effect bespoke a lack of buoyancy.

The eagle was gone as suddenly as it had appeared. While the encounter had been all too brief, the picture it left in my mind was indelibly stamped there and, being an ornithologist of sorts, I was overjoyed. For what it was worth, I had seen the monkey-eating eagle in its stronghold.

The monkey-eater is a solemn, somewhat sedentary bird. (Courtesy Zoological Society of San Diego)

ird.
go)

"May we come in?"

"He's just a bit bashful."

THE RACCOON *(Procyon lotor)* ranging from southern Canada to Panama, is probably one of the best known mammals in North America. Striking in appearance, interesting in habits, and abundant in many regions, it is not surprising that we find it referred to in 1612 by Captain John Smith in his description of Virginia. He called it by its Indian name *Aroughcun* from which we derived raccoon or "coon."

Raccoons are most often found where there is a combination of trees and water. Trees provide them protection and cavities for homes. Water, fresh or salt, supplies a favorable environment for some of their favorite items of food, including frogs, fish, crayfish, crabs, oysters, and clams. Raccoon tracks in the mud are a familiar sight to many along the shores of creeks, marshes, and sloughs. They are omnivorous, however, seeking fruits, nuts, and berries in the summer and autumn months. Even insects and mice are eaten if other food is scarce. The popular notion that raccoons wash their food stems from the fact that they

"I'll try one of these."

"Unnngh! My dentist wouldn't approve of this."

"Thanks, I can reach it."

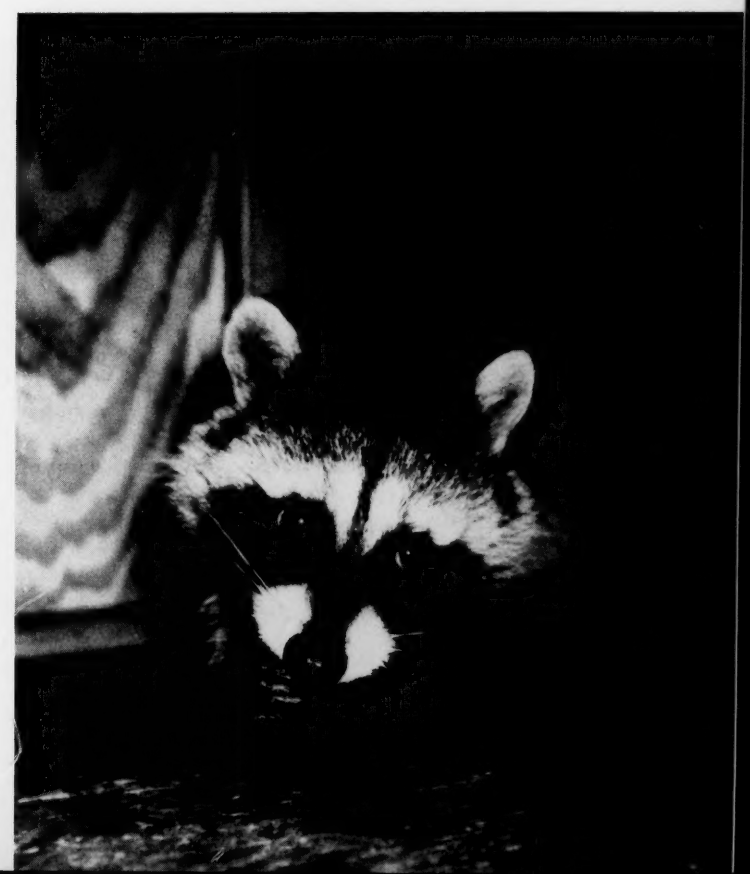
Raccoon Reception

These candid photographs were taken in Mill Valley, California, with a Hasselblad 2¼" reflex camera, using Heiland Strobinar flash equipment.

PHOTOGRAPHS BY **EDWARD S. ROSS**

TEXT BY **ROBERT T. ORR**

"Sorry I'm late. Are the hors d'oeuvres all gone?"

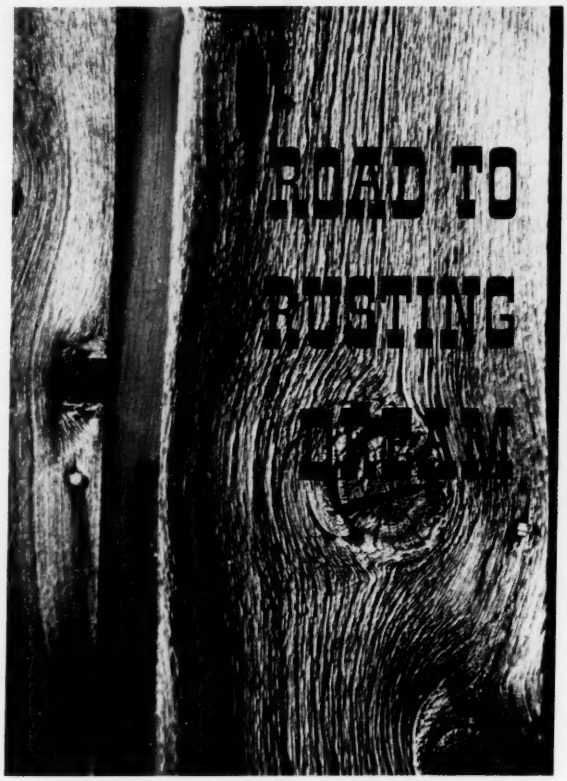


do sometimes dunk it, perhaps to soften it [see Clifford B. Moore, *Ways of Mammals* (1953), p. 83.—Ed.].

The young, two to six, but usually numbering about four, are playful but soon learn to follow their mother on hunting expeditions. At the first sign of danger they will take to a tree. In regions where it is cold in winter raccoons go into a torpid condition, somewhat as bears do. Where it is warmer they are active the year around.

Raccoons have always been of economic importance in the United States, for fur, food, and sport. In the pioneer days their pelts were of considerable value as a medium of exchange. Even today they are one of our major fur-bearers and in certain regions their meat is considered quite desirable. In the early days of California raccoons sold for one to three dollars apiece in the San Francisco markets. Hunting raccoons has long been a major sport in parts of the country but perhaps the greatest pleasure comes from making friends with these interesting little animals.

FRAN HUBBARD



Weathered siding, Tioga mine building. (NPS)

HIGH IN THE SIERRA near the boundary of Yosemite National Park is an old mine, its machinery quietly rusting away, and its buildings weathered to a golden brown. This is the Tioga—dream of a fabulous fortune which never came true.

Thousands of motorists travel Yosemite's famed Tioga Road, over California's highest mountain pass, every year without knowing the interesting story of high hopes, feverish excitement, and finally heartbreak that went into this mighty effort, for which the road was originally constructed.

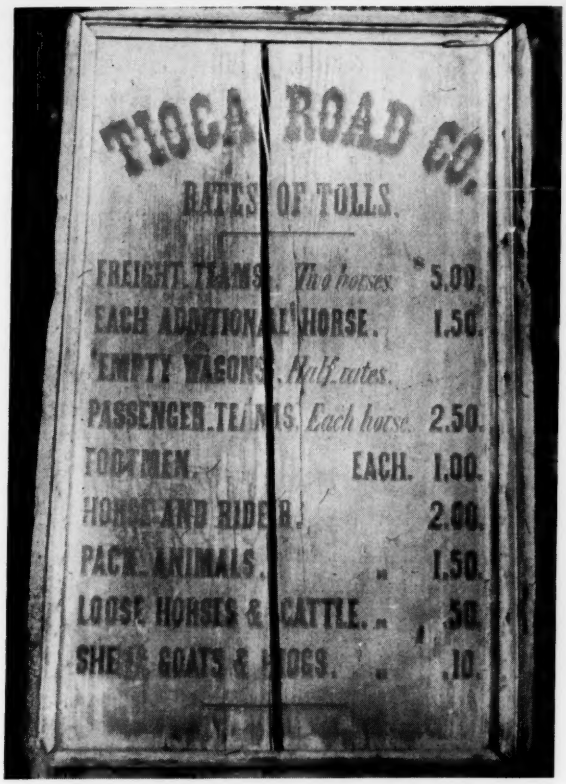
This region of California has long been known for mineral riches. A score of years before Marshall's discovery of gold at Coloma in 1848 electrified the western world, Jedediah Smith, famed trapper and explorer, found gold near Mono Lake, some 15 miles east of Tioga Pass. Lieutenant Tredwell Moore, who led an infantry detachment from Fort Miller in pursuit of Indians in 1852, discovered gold and other minerals while exploring the Bloody Canyon and Mono Lake regions. Two years later Leroy Vining and several companions went to where Moore had found gold, establishing themselves on "Vining's Creek," the Leevining Canyon of today, up which winds the eastern portion of the Tioga Road.

So much for the prelude. From W. A. Chalfant's *Gold, Guns and Ghost Towns* we learn that in 1874 a young man named Brusky, prospecting near the Sierra crest, came upon an old prospect hole marked by a rusted pick and shovel and a tin location notice. The names of the original locators were undecipherable, but "Sheepherder" and "1860" could be read. The first prospectors were assumed to have perished and the mine was thus relocated. At an elevation of 10,000 feet, it is in a region noted both for its summertime beauty and the bitterness of its winters.

Brusky was unable to finance the operation, and the property passed into the hands of a group of men from the East, mainly New Bedford and Boston, who organized The Great Sierra Consolidated Silver Company in December 1881 to mine the riches. A survey made at their request by an English mining expert estimated a surface ore value above 12 million dollars, and other experts were equally optimistic. At this time the town of Bennettville was founded and given a post office named for Thomas Bennett, Jr., president of the company. It soon became headquarters for the Tioga Mining District. Preparations were made for driving the Great Sierra Tunnel to cut the Sheepherder and adjoining lodes and to make removal of ore possible through a horizontal tunnel instead of a costlier vertical shaft.

In *One Hundred Years in Yosemite,* Carl Russell states that the company apparently suffered from no lack of funds: "Great quantities of supplies and equipment were packed into the camp at enormous expenditure of labor and money. At first the place was accessible only via the Bloody Canyon trail, and Mexican packers contracted to keep their pack animals active on this spectacular mountain highway." It is said that Bloody Canyon received its name from bloodstains of unfortunate pack animals scraping along the narrow, steep trail.

Machinery, including a steam engine, boiler, air compressor, and drills were essential to drive a shaft into the hard rock of the region, and the story of how this was dragged by sheer manpower up the almost-vertical face of the Sierra, in the dead of winter, will go down in history. Let us


TIOGA ROAD CO.
RATES OF TOLLS.
FREIGHT TEAMS. Two horses $5.00
EACH ADDITIONAL HORSE. 1.50
EMPTY WAGONS. Half rates.
PASSENGER TEAMS. Each horse. 2.50
FOOTMEN. EACH. 1.00
HORSE AND RIDER. 2.00
PACK ANIMALS. 1.50
LOOSE HORSES & CATTLE. .50
SHEEP, GOATS & HOGS. .10

The Tioga was a toll road, rates high! (NPS)

turn to the *Homer Mining Index,* published in Lundy, starting point of the trip, for March 4, 1882: "The transportation of 16,000 pounds of machinery across one of the highest and most rugged branches of the Sierra Nevada mountains in mid-winter, where no roads exist, over vast fields and huge embankments of yielding snow and in the face of furious wind-storms laden with drifting snow, and the mercury dancing attendance on zero, is a task calculated to appall the sturdiest mountaineer; and yet J. C. Kemp, manager of the Great Sierra Consolidated Silver Company of Tioga, is now engaged in such an undertaking, and with every prospect of perfect success at an early day – so complete has been the arrangement of details. . . . The machinery will probably be hoisted straight up to the summit of Mount Warren ridge . . . an almost-vertical rise of 2,160 feet. From the summit the descent will be made to Saddlebags Lake, thence down to and along Lee Vining Creek . . . and from that point to Tunnel, a distance of about one mile. . . . The machinery consists of an engine, boiler, air compressor, Ingersoll drills, iron pipe, etc., for use in driving the Great Sierra tunnel. It is being transported on

The click of a telegraph key suddenly put "The Great Sierra Wagon Road" out of business

six heavy sleds admirably constructed of hardwood. . . . A pair of bobsleds accompanies the expedition . . . laden with bedding, provisions, cooking utensils, etc. The heaviest load is 4,200 pounds. Ten or twelve men, two mules, 4,500 feet of one-inch Manila rope, heavy double block and tackle, and all the available trees along the route are employed in 'snaking' the machinery up the mountain. . . ."

Chalfant adds: "As each capstan was reached the apparatus was dismantled and carried forward to the next stage. Inch by inch the traction rope was wound in. . . . The loaded sledges broke through the snow again and again, wedging themselves so that they had to be pried out with pole and crowbar, or block and tackle snubbed to trees, or to steel arduously set into rocks. Every ounce of propulsive effort was furnished by human muscle." The 10-mile trip required more than two months. Little was recorded of the suffering of the men, but it is not surprising that Mr. Kemp remarked at the completion of the task, "It's no wonder that men grow old!"

Such difficulties prompted the construction in 1863 of the Tioga Road, then called "The Great Sierra Wagon Road," to facilitate hauling materials and supplies to the mine. Extending some 56 miles from Crocker's Station to Tioga, it was built in less than five months, largely by Chinese labor, at a cost of $62,000. Work proceeded at fever pitch at the mine. A sawmill was erected to furnish mine timbers and lumber for buildings. The tunnel was driven more than 1,700 feet through rock so hard that from three to five shifts of miners frequently labored to drill a single round of blasting holes.

As the tunnel neared the fabulous Sheepherder Lode, the board of directors decided that a survey of the company's finances was imperative, before the lode was cut, according to a report made by Bennett. Though indications were that the lode may not have been more than 50 feet ahead, the private telegraph line of the company clicked out a message to the superintendent on July 3, 1884, ordering him to close everything down. The orders were obeyed promptly – tools were left in the tunnel and dishes remained on the tables in the mess hall. More than $350,000 had been ex-

Tioga's machinery quietly rusts away. (NPS)

pended in the endeavor, with not a penny in return. Intentions to reopen the mine after a brief shutdown were never carried out. Several subsequent efforts have been made to continue the tunnel and reach the lode, one as recently as 1936, but all have failed.

The Great Sierra Wagon Road fell into disuse and disrepair following the closing of the mine. Although much of it was within the boundaries of Yosemite National Park, it remained the property of heirs of the founders of the Great Sierra Consolidated Silver Company. Dynamic Stephen T. Mather, first director of the National Park Service, started a drive to acquire public ownership of the road. Donating about half of the $15,500 purchase price from his own pocket, Mather deeded the road to the Federal government in 1915. Several leading automobile clubs financed needed repairs. The road joins the so-called "Leevining Creek Road" near Tioga, making a crossing over the Sierra Nevada possible, by a route once considered for the transcontinental railroad!

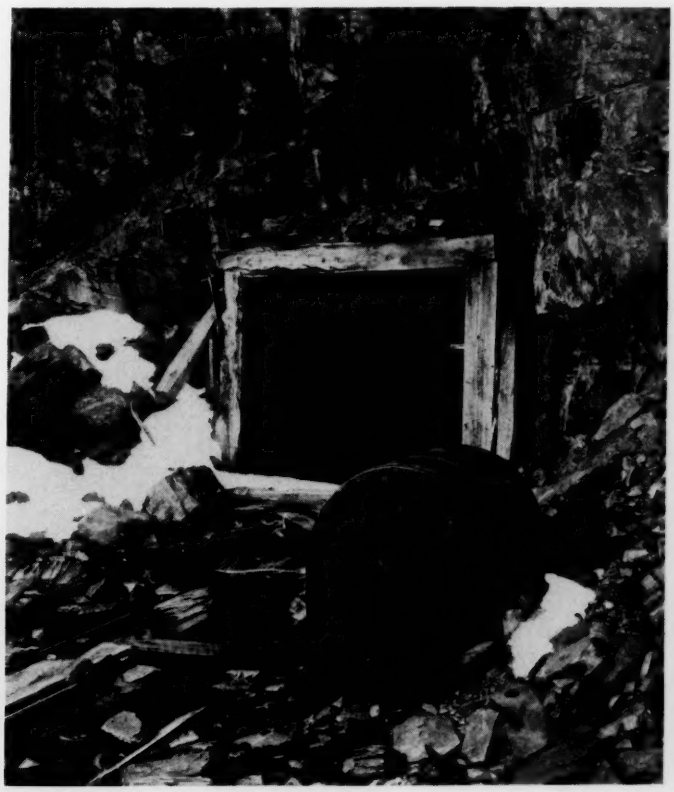
Much original alignment has been improved. Curves have been straightened and super-eleva-

This was Bennettville (Tioga) on August 8, 1898, with red Mt. Dana in the background. (Celia Crocker Thompson)

Bennettville in 1902, looking toward Mt. Tioga. (Celia Crocker Thompson)

tions added. Twenty-one miles of the old road remain in use, however, inviting the traveler to slow down and enjoy some of the most spectacular mountain scenery in the West. Only this, together with the rusting machinery at the ghost town of Bennettville, remains to remind the present generation of the fortitude and effort which went into one of the West's greatest mining ventures — for naught.

Entrance to the old mine in solid rock. (NPS)



Some old mine buildings still stand. (NPS)

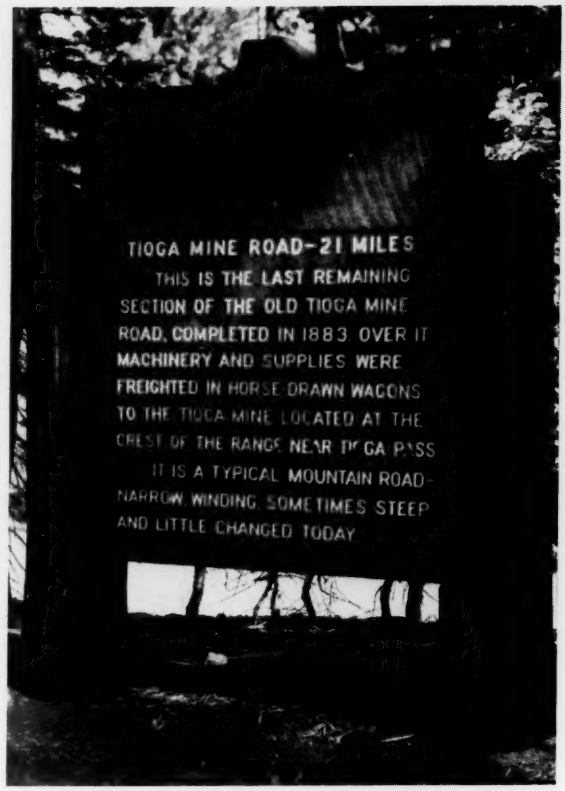
WHICH ROAD TO TIOGA?

HAROLD C. BRADLEY

FRAN HUBBARDS's interesting sketch of the Tioga Mine wakens many memories. I saw it first as a boy in 1893 — just ten years after the road had been completed and then suddenly abandoned. Barring a few washouts and fallen trees it was still in fair repair, and made an excellent trail in to the Tioga Country from Crocker's stage station on the Big Oak Flat road. The cabins at Aspen Valley, White Wolf, Lake Tenaya and at the mine itself were in good shape, but with tools and utensils scattered about as though the occupants had just left hurriedly, and might return at any moment. I was deeply impressed with the dramatic beauty of this high alpine country; its vastness; its emptiness. We met no one on the trip. But, to my adolescent imagination, the place was still occupied by the miners whose works and belongings we were constantly discovering. Always they kept just out of sight, but were a haunting influence which neither my father's tolerant reassurance nor my own reasoning could quite abolish. No later mountain experience has ever awakened such a vivid mixture of emotions — and this may account for the special and perhaps exaggerated regard in which I still hold the Tioga Country.

Today, the Tioga Country has a much more practical and general interest. It is no longer real wilderness. It is no longer empty, in summer. Its vastness has shrunken with time and familiarity. But it has maintained a semi-primitive atmosphere that gives it quality and charm, greatly appreciated by many. It survives as it is, under a suspended sentence. The Master Plan calls for a high-standard highway from the El Portal Road just west of the Valley, which will replace the mine road and provide easy access to the high country and across the range at Tioga Pass. Two thirds of the planned highway was completed before the war halted unessential construction. The middle third — between White Wolf and Tenaya Summit — remains essentially the old mine road, just as it looked in 1893. It follows the contours of the region, winding in and out of every ravine. Often it is too narrow for cars to pass except at the frequent turn-outs. It is sometimes steep enough to require second or low gear. In some sections it is rough. You drive it automatically at 15 to 20 miles an hour, in order to stay on the road. Because it looks dangerous, no serious accidents ever occur along its 21 miles. Somehow it still manages to carry all the traffic that desires to cross Tioga Pass or sojourn in the cool high country. Delays and frustrations are not infrequent, however, when traffic is heavy, and while many enjoy the road just as it is and would be glad to have it remain so, it is probable that the great majority of drivers would agree it should be improved. Controversy arises over just how much.

The official solution is to complete the realignment as laid out in the Master Plan, developed in the early thirties. This will provide a highway of consistently high standards from Yosemite Valley and east-west across the Park and the Sierra. Had it not been for the war, this solution would long ago have become reality and no controversy would exist. The war, and the lack of appropriations since the war, permits us a reappraisal of the probable effects of the Master Plan on the Tioga Country, and to at least consider some of the alternate solutions that have been proposed, in the light of information not available in the 'thirties.


TIOGA MINE ROAD–21 MILES
THIS IS THE LAST REMAINING
SECTION OF THE OLD TIOGA MINE
ROAD. COMPLETED IN 1883. OVER IT
MACHINERY AND SUPPLIES WERE
FREIGHTED IN HORSE DRAWN WAGONS
TO THE TIOGA MINE LOCATED AT THE
CREST OF THE RANGE NEAR TIOGA PASS
IT IS A TYPICAL MOUNTAIN ROAD–
NARROW WINDING SOMETIMES STEEP
AND LITTLE CHANGED TODAY

(NPS photo)

If the 21-mile souvenir of the old mine road is realigned as planned, we may anticipate high damage to the mountain and forest scene, comparable to that found on the completed sections. It is the inescapable down payment we and the Park will have to make for long radius curves and grades not to exceed 6 per cent. The long-range effects are the more important, however. The completed highway will become a cross-mountain traffic way, connecting on the east with U. S. 6, and providing three routes on the west to and from the Central Valley. Because both cool and fast, it will be a popular through route in summer. It will introduce into the Park a stream of traffic interested not in the Park and the scenic and recreational values it has to offer, but in the short cut across the Park that the road will provide. Since the highway so far is built for speeds up to 60 miles an hour, this through

(NPS photo)

traffic will be fast traffic. Serious and fatal accidents have already occurred on the completed portion. In the upper country developments will be accelerated – more gas and service facilities, eating places, lodgings. These changes are certain to come with increasing numbers, just as they have in Yosemite Valley. But in this case they will be augmented and perhaps determined by this added factor of undesired traffic quite foreign to the purposes of the Park.

The four alternatives that have been proposed aim to reduce the immediate scarring of the Park scene, or the long range deterioration of the semi-primitive atmosphere of the Tioga Country, or both. If the width of the road surface and shoulders can be kept low, the wide open corridors through the forested sections can be avoided. If curves and grades can be made flexible and appropriate to the terrain itself, the scars produced by massive cuts and fills can also be reduced. With cars all equipped these days with gears adequate to handle grades up to 25 per cent or more, there appears to be no compelling reason for providing a road all of which can be driven in high gear – unless indeed speed is the objective, and this in spite of a legal Park speed of 35 miles an hour. If the built-in speed of this section is kept at about 35 miles an hour – and this is what the lower standards will accomplish – in addition to preventing excessive scarring the attraction to through traffic will also be reduced, as well as the unfavorable impact on the high country.

The Sierra Club, which has studied the problems of Park roads for many years, has recommended drastic revisions downwards of the standards required for the mountainous sections of our parks, for the reasons stated. Whether they are adopted by the Park Service and the Bureau of Public Roads will depend on the extent of public support given such recommendations.

One alternative accepts the new routing of the highway east of Porcupine Flat and around Tenaya Lake, but urges reduced standards in road design. A second, also at reduced standards, seeks to avoid the inescapable damage to the fine dome area east of Tenaya Lake, which even the lower standards will produce, by routing the new highway around the rim of Murphy Creek and north of Polly Dome. The old mine road – adequately improved – would then be retained only for access to the lake.

A third proposal is to widen and surface the old mine road to about the standards of the Big Oak Flat road west of Crane Flat. Such a solution would cost the least and would produce no new scars. Speeds would automatically be between 25 and 35 miles an hour. Through traffic would not be attracted.

A fourth and more radical suggestion is to widen slightly and surface the old mine road just as it is, and use it as a one-way member of a double road, to carry east-bound traffic only. The second member, built to a similar design, and for the most part out of sight, would carry only west-bound traffic. This would be an innovation in Yosemite Park – though one-way roads elsewhere have proven satisfactory. It has the advantage over all the other alternatives of providing the completely restful and relaxed experience of driving where there is no opposing traffic. Even on the broad highway, opposing traffic is a hazard and a cause for anxiety and tension. The character of the road would still enforce the leisurely pace of 20–25 miles an hour, which would effectively reduce the attraction to fast through traffic. Costs would be moderate, visible scarring minimal. The sense of seclusion and intimate contact with the forest and the roadside scene, at its best, will remain.

Each of the solutions summarized above has its advantages and its disadvantages. There probably is no perfect solution. Park policy must often be shaped as a compromise between the divergent desires of the visitors and the fundamental directive of the National Park Act to provide for the enjoyment of the parks in such a way as to "leave them unimpaired for the enjoyment of future generations." What kind of road we get in place of the 21 miles of mine road will depend in no small measure on what we, the owners and users of them, desire – providing of course we make our desires known.

THE CASE OF THE PIEBALD FLOUNDER

W. I. FOLLETT

Southern starry flounder, upper surface (×½). (Photograph by the author)

THE FLATFISHES, known to science as the order Heterosomata, comprise some 400 species, including the flounders, soles, halibuts, and dabs of the fish markets. All are distinguished by a remarkable metamorphosis that occurs in early life.

Upon emerging from its egg capsule, the young flatfish has an eye on each side of the head, and swims freely about, back upright, near the surface of the sea. As the tiny fish grows, one eye begins to shift, gradually moving across or through the head until it reaches a position near the eye of the opposite side. Thenceforth the fish lies flat on the sea bottom, both eyes now in a position to see the approach of prey. The upper side, bearing the eyes, soon develops the color pattern, usually in browns and grays, that characterizes the particular species and serves to conceal it by resemblance to its surroundings, while the "blind" side, on which the fish lies, loses its original pigments, and in most species becomes white.

Rarely, this white of the under surface may encroach upon the ocular side, creating a piebald pattern of highly irregular spots and blotches against the normal dark background. This type of aberrant coloration is said by J. R. Norman *(Monograph of the Flatfishes,* 1934, p. 23) to follow an injury to the fish, especially one that affects any part of the vertebral column.

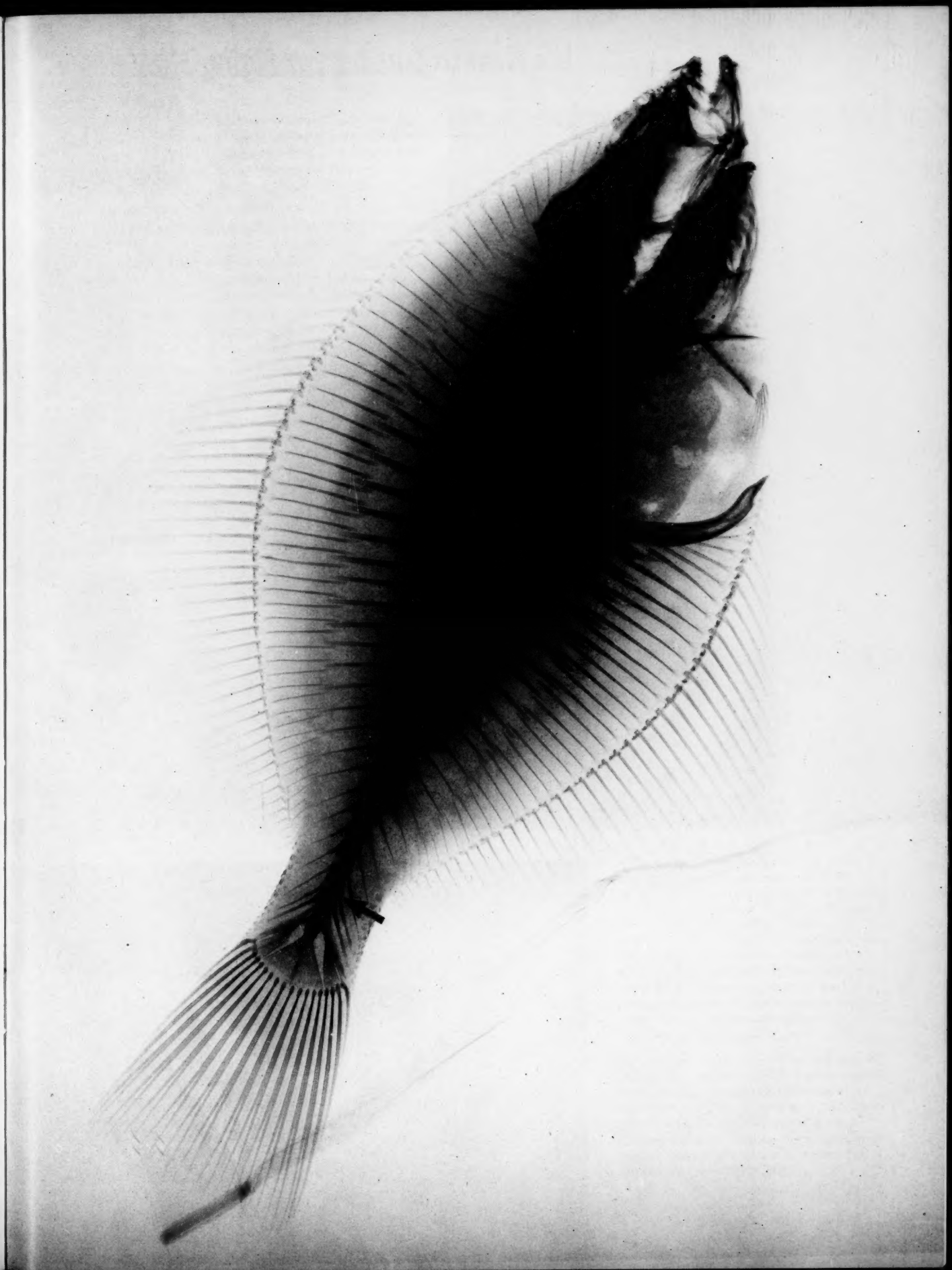
There appears to be no published record of the occurrence of this piebald coloration in the southern starry flounder, *Platichthys stellatus rugosus* Girard, a common fish along the California coast, but on January 30, 1953, William H. Landman, fishing from the Berkeley pier in San Francisco Bay, obtained a fine example of this aberration, in which irregular white blotches occur on the ocular side, principally on the caudal peduncle (the stalk of the tail fin) and elsewhere over the posterior one-third of the body, but extending forward to the pelvic fins and to the back above the front part of the lateral line. This specimen, shown in the accompanying photograph, measures 243 millimeters in standard length and now bears Catalog No. 25738 in the Department of Ichthyology of the California Academy of Sciences. Although its meristic data indicate no abnormality,* an X-ray reveals a developmental abnormality or injury affecting the 22nd and 23rd caudal vertebrae, which have the appearance of having been driven together to such an extent that they are measurably shorter than the vertebrae before and behind them.** This particular specimen therefore appears to corroborate Norman's statement as to the cause of the anomalous piebald coloration.

*Fin rays: Dorsal 59, anal 41, pectoral 12–12, pelvic 6–6, caudal (principal) 7+7. Gillrakers 4+9–4+9. Lateral-line pores 78–72. Branchiostegals 6–6. Vertebrae (by X-ray) 11+25=36.

**

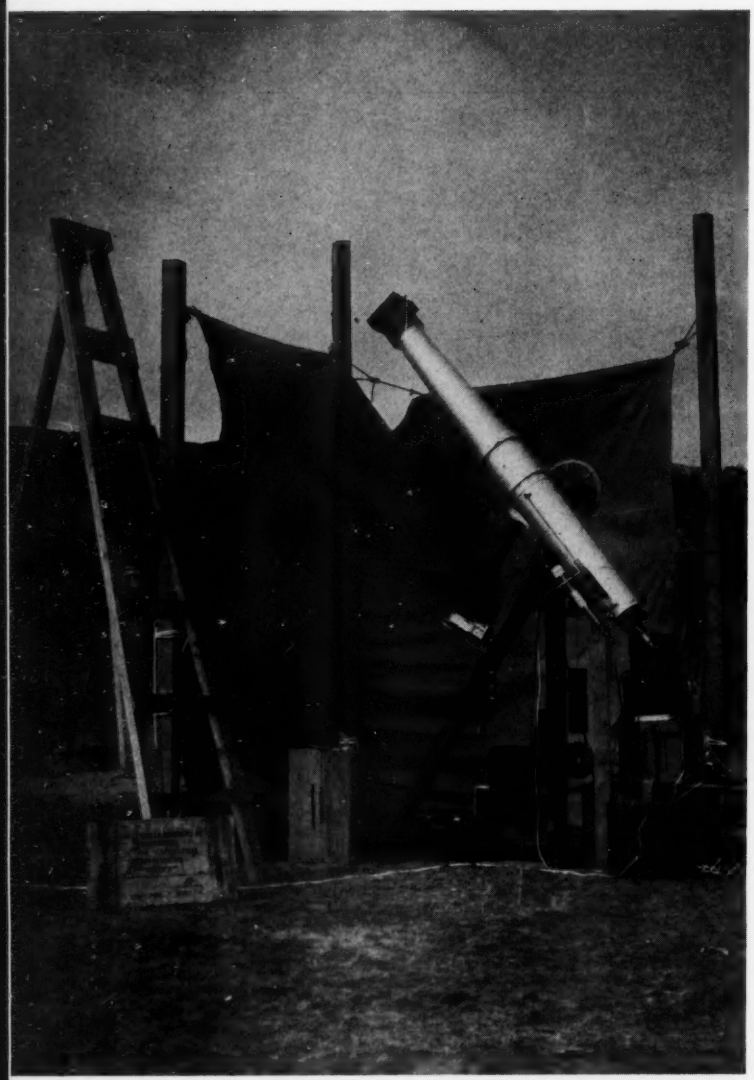
Number of vertebra	18	19	20	21	22	23	24
Length in millimeters	5.1	5.1	5.1	5.1	4.2	4.3	5.6

The X-ray clearly shows the abnormal vertebrae (×11½). (X-ray by Dr. Carl B. Bowen)



(×11/12).
Bowen)

We Flew to Sweden for Flying Shadows



A TOTAL ECILPSE of the sun is one of nature's grandest spectacles. The prospect of observing one puts a strange light in any astronomer's eye and – if it is to be a particularly good one – sends scientific expeditions half way around the earth for the best view. Months of preparation, at the expense of the astronomer's regular work, may go into a long-range gamble that the sky will be clear for a few minutes at the critical time and place half the world away.

With an eclipse on the astronomical calendar for June 30, 1954, the idea of a California Academy of Sciences expedition to observe it was born in the winter of 1952. Mr. C. P. Butler, physicist in the Navy's Radiological Defense Laboratory at Hunters Point, San Francisco, suggested to the Academy's Dr. G. Dallas Hanna that a photoelectric and photographic recording of the *shadow-band phenomenon* at eclipse time would make a good project for our Department of Astronomy.

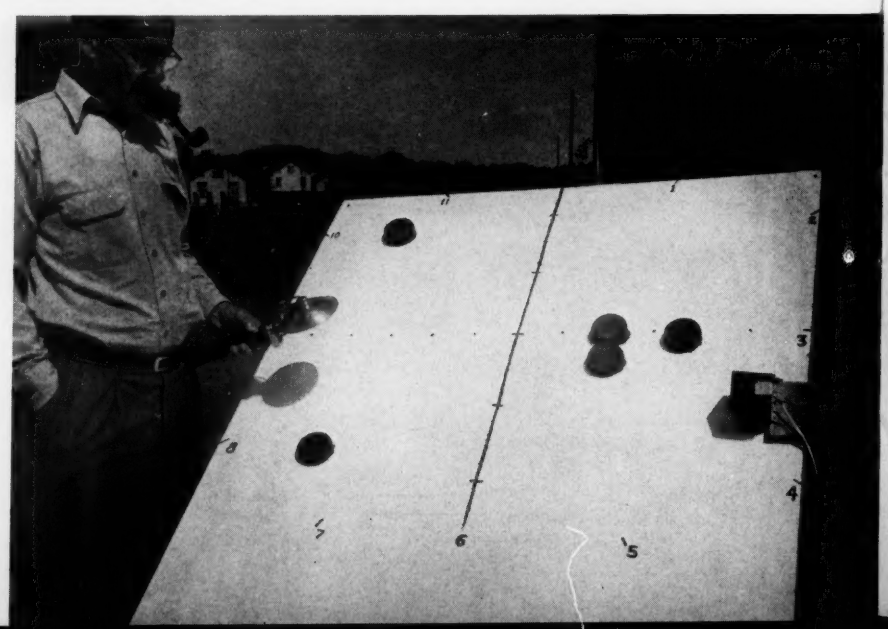
These so-called *shadow-bands*, or "flying shadows," have nothing to do with the sun, which simply provides the light they are seen by. The bands are produced by *ripples in the earth's atmosphere;* when the light from the thin crescent of the partially eclipsed sun passes through the air, alternate bands of light and dark appear on a white surface for a few seconds before and after the total phase. Many reports of this phenomenon have been made, but without benefit of precise measurement.

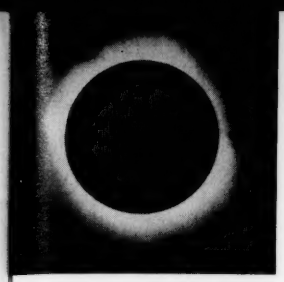
By the end of August 1953 the Academy's council and board of trustees had approved a plan of shadow-band observation. Members and friends of the Academy contributed most of the necessary funds; a research grant from the American Association for the Advancement of Science provided the rest, except for the proceeds of a "benefit night" at the Morrison Planetarium for which San Francisco's Scandinavian-American population turned out en masse.

Local Scandinavian interest in the project was aroused when Dr. Folke Nettelblad, a Swedish astronomer interested in a special phase of the work, ac-

▲ The Davidson telescope was set up at the site of the California Academy of Sciences 1954 Eclipse Expedition on South Koster Island, Sweden. The canvas windshield was a must – to keep the prevailing southwesterlies from vibrating the instrument. The ladder was used during observations of scintillation where a series of diaphagms had to be shifted rapidly in front of the lens. The boxes of electronic equipment used in the photoelectric recording of scintillation are shown stacked under the eye end of the telescope.

➔ The beaded white screen for recording the shadow-bands had five photocells (capped with black rubber when not in use) set into it, while four more cells (not shown) were placed on the ground nearby. Mr. Butler holds the flash gun which was used to impress photocells and camera simultaneously in order to mark an initial time on both records.





The sun's corona, photographed during total eclipse of September 22, 1922 from Wallal, Australia, by the William H. Crocker Expedition. (Courtesy Lick Observatory)

cepted an invitation to become the third member of our party. Through him it was arranged to locate the Academy expedition at an eclipse camp being set up on South Koster Island in the Kattegat by Lund Observatory. The Director, Dr. Knut Lundmark, generously invited us to share the installation. And through the coöperation of the USAF Cambridge Research Center, with which Mr. Butler had been corresponding, the two of us were flown from San Francisco to Sweden by MATS. Our heavy equipment went a month ahead of us by water.

A 7-day, 6,000-mile trip, eventful and interesting, by way of the Azores, Frankfort, and Copenhagen, brought us finally to Sydkoster, a little fishing and summer-resort village. We were soon comfortably quartered among very friendly folk who seemed always anxious to do whatever they could to be helpful.

June 17 dawned gray and cloudy, and remained so all day – we were to become all too familiar with those gray skies! It was our day to begin setting up the complex array of equipment that had to be in perfect order by 1:30 P.M. on the 30th.

Butler's job was to record the shadow-band phenomenon. Salanave had earlier suggested that measurements of astronomical seeing and scintillation of starlight would be valuable adjuncts to the shadow-band data. It was this aspect of the Academy project that had interested Dr. Nettelblad; he had made an extensive study of scintillation or "twinkling" of the stars. Using the Davidson 6.4-inch refracting telescope brought from the Academy, Salanave and Nettelblad, with the latter's photoelectric equipment, were to record the scintillation pattern of the star Pollux near the sun at eclipse time. Also, Salanave planned to make certain visual measurements of the seeing conditions.

The two distinct but correlated observing programs required separate installations; however, each of us helped the others and was helped in turn – a sort of round-robin of coöperation. This pleasant arrangement extended also into the neighboring expeditions: astronomers and technicians from Lund, Stockholm, Uppsala, Madrid, and Washington, D.C., borrowed our brawn and our tools and we borrowed theirs. It is no exaggeration to say that, had the eclipse itself been a total loss, our experience in this brand of international relations would have been sufficient reward. We were especially indebted to Dr. Anders Reiz, leader of the Lund Expedition at Sydkoster, for his helpful interest in our project.

The shadow-bands were to be caught on a white screen presented to the fading light of the sun's crescent. A camera was to get the moving bands at the same time nine photocells connected to an oscillograph were registering light fluctuations through a triangular pattern of holes in the screen. Data on the shadow movements thus secured would lead to a determination of the velocity, wavelength, and other physical characteristics of this somewhat mysterious phenomenon.

Seeing the array of long black phototubes pointed toward the sun, some Islanders thought we were going to shoot rockets at the moon during the eclipse; and from the way they reacted to our statement about studying "flying shadows," we were sure some thought we were actually investigating "flying saucers" – the crazy *Amerikaners!*

The unbreaking overcast hampered desperately our preparation of the refractor for scintillation measurement, especially at night. To calibrate the instrument properly we had to focus on a bright star. From June 20 to 29 there were only three nights with *any* clear sky. (The days were almost as bad, for sun sights; while we were on Koster there were storms of wind and rain such as Californians expect only in midwinter – the natives of course vowed this was surely the worst summer within memory!) Another hindrance to star sighting was the perpetual twilight – at 58°52′ latitude we were within 8 degrees of the Arctic Circle where it was easy to read a watch outdoors at midnight. It was hard to get sights in the less than four hours of relative darkness, but the soft colors in the midnight sky and a waning moon hanging at an unfamiliar angle made a picture not soon to be forgotten.

At last, the night before eclipse day, we put the equipment for measuring seeing-conditions through a test run on Arcturus. Everything functioned perfectly. One of the novelties in Nettelblad's observational procedure consisted in recording the fluctuating light of the twinkling star on magnetic tape–when the tape is played back, one can "hear a star twinkle!"

The 29th dawned bright and clear; the sky was remarkably transparent. A large mass of polar air, it was said, had moved over the whole of southern Sweden. Hopes ran high. But that evening, while the Koster sky was still pure blue, radio reports from the Norwegian meteorological service predicted clouds for the 30th. The Norwegians have a reputation for weather prediction. Sure enough – next morning the sky was covered by the usual thick blanket of gray. By 11 some blue gaps showed – maybe it would break. But by 12:27 when the moon first moved in front of the sun and the partial phases began, the sky was at least 50 per cent cloud-covered. With one hour and 13 minutes to go until the crucial 153 seconds of total eclipse began, tension was growing. One

Wildlife, conservation, and the law

Our Wildlife Legacy. By Durward L. Allen. Funk and Wagnalls Co., New York. 1954. x + 422 pp., 26 halftones. $5.00.

This is a truly exceptional book in the expanding output of conservation writing. It is prepared with great care and with sincere effort to do the best possible with both the facts and their presentation. Not only so much, but the author has apparently tried hard, and with success, to say familiar things essential to his text with a new twist and in a fresh framework of facts so that there is nothing rehashed or trite. The style is forthright, the phrasing incisive and often pithy. The result is that the text manages to be stimulating and provocative in a remarkably sustained way – a fact which is a real credit to the author.

That this is so is perhaps not too surprising when we realize that the author is a trained biologist with extensive research background and a man competent to attempt a proper communication of modern concepts of game biology, land use, and ecology to the general reader. At present he is a biologist on the staff of the Fish and Wildlife Service. His approach to this job of communication is therefore based on a happy combination of professional knowledge and effective writing ability.

The well-organized text consists of 19 chapters divided into three parts. The first part, titled "Numbers at Work," deals with population phenomena. Such concepts as turnover, reproductive potential, limiting factors, and habitat management are present in a historical context and with an evaluation of the accomplishments to date of wildlife biologists in managing both fresh-water and upland game species. The second part, titled "Paths and By-Paths," deals with the impact of man on game species and in particular with the problems provoked by exploitation and management. The third part is titled "The Method and the Outlook," and argues for the integration of the latest research findings with mature and selfless principles of conservation.

A feature of this book especially appealing to a critical reader is an appendix of reference notes on source materials. In the main part of the book evidence presented is not burdened with formal citations which would interfere with the style and flow of the text. But the sources are given, by chapter and page numbers, in the appendix. There follow a bibliography of 501 titles (30 pages) and an index.

A measure of the author's viewpoint is given in his closing words: "I have assembled here what appears to be truth, but it seems to do violence to many of the preconceptions on which wildlife policies of the past were based. More than anything else it shows that our thinking must,

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of the expeditions concerned with accurate timing of the eclipse's progress from phase to phase started its movie camera at the first contact. The grinding of gears, and the timekeeper's counting of seconds, were the only sounds in the waiting camp.

By Totality minus Three Minutes, there was a weird scene about us. The light coming from the last crescent of the sun's disc, filtering through thin clouds, fell ash-pale on the ground. Butler started up his recording devices. Unfortunately the flare of a flashlight bulb used to put simultaneous time marks on both photocell and camera records temporarily blinded him so he could not see whether or not the shadow-bands appeared. No matter – if the instruments were doing their work it would all be on the record!

At the same time Salanave at the Davidson telescope was looking for Pollux so that the measurements of seeing could be carried out. Clouds were proving to be a serious obstacle, but just a minute before totality a break appeared and there, centered in the finder telescope, was Pollux. Fortunately this pre-setting of the telescope (for which there could be no rehearsal) had been right "on the button." But the clouds had already cut off so much precious observing time it seemed advisable to skip part of the planned visual observation and go directly to Nettelblad's photoelectric measurements.

Probably neither he nor Salanave could give an exact account of what happened in the next two and one-half minutes, but there in the shadow of the onrushing moon they went into swift action to carry out the program of measurements according to the modified plan. As it turned out, the photoelectric measurements were completed in time to return to the visual observations, so none of the program was actually sacrificed.

It is very difficult to describe one's feelings on seeing a total eclipse for the first time. The ghostly light of the fading crescent, the sudden flare of reddish light as the prominences appear, and finally the abrupt spreading out of the coronal streamers – all are vivid impressions. Busy at telescope or camera, an astronomer sees little of this; he merely senses it. One may – as we did – hear a gasp from the crowd of onlookers as the corona bursts forth. In spite of partial cloudiness this eclipse displayed a fine view of the inner corona – spindle-shaped, as is characteristic during a time of sunspot minimum. With the ending of total eclipse, returning light bursts over the scene, dazzling eyes almost accustomed to darkness.

AT THIS WRITING, photographs and other records of the California Academy of Sciences 1954 Eclipse Expedition have still to be reduced. The question "Did you succeed?" cannot yet be answered. Preliminary considerations have put the label "50 per cent" on results, because of the partial cloudiness over South Koster. Perhaps this expedition will prove to be the pioneer for others to follow in years to come – the California Academy of Sciences may become as well known for eclipse expeditions as for voyages to the Galápagos! L.E.S.

periodically, be realigned. . . . Like those animals which succeed in the wild, we must be resilient, adaptable, and forever searching outward in our environment for that which can benefit us."

An eminent game biologist compared Durward Allen's new book to Aldo Leopold's widely known *Game Management*. This is a well-deserved plaudit.

FRANK A. PITELKA

Museum of Vertebrate Zoology
University of California

Conservation Law and Administration: *a case study of law and resource use in Pennsylvania.* By William F. Schulz, Jr. The Ronald Press Company, New York. 1953. 607 pp. $10.00.

Conservation laws are altered every time a state legislature convenes, but rarely is the overall legal pattern of resource regulation objectively analyzed. Mr. William F. Schulz, Jr., Professor of Law at the University of Pittsburgh, offers in this volume a critical appraisal of existing conservation law in the Commonwealth of Pennsylvania. There are chapters on forests, water, fish, game, soil conservation, general outdoor recreation, and conservation education. Weaknesses in present legal and administrative structures are pointed out and a "Model Act for Conservation Administration" is suggested which might guide future legislation in any state. This valuable study is one of a series of projects subsidized by the Conservation Foundation. A. S. L.

Wildlife in Alaska: *an ecological reconnaissance.* By A. Starker Leopold and F. Fraser Darling. Sponsored by The New York Zoological Society and The Conservation Foundation. The Ronald Press Company, New York. 1953. ix + 129 pp., 22 photographs, 6 maps. $2.75.

"Science Discovers Alaska" was the theme of Governor Heintzleman's foreword to our Alaska issue, May-June 1953. With scientists busy "discovering" Alaska in ever sharper detail, it is plainly wise to look to them for objective opinions about her, not to the promoter ilk.

"This field study concerns the great horned animals of Alaska and their environment in one of the last frontier lands of the world," Fairfield Osborn, president of both sponsoring groups, says in his Foreword to *Wildlife in Alaska*. "A work of keen observation and scholarship, it analyzes the ever changing relationships between man, these grazing animals [caribou, reindeer, moose], and their habitats. It stresses the importance of wildlife management in a territory whose invaluable assets are the living natural resources on the land and in the adjacent waters."

The *living natural* resources! Not the gold or possible oil? Nor yet the Development potential – agriculture, vast population increase? Let the authors speak; they speak with equal clarity throughout this forthright book:

. . . Any expectation of a rapid (population) increase to the half-million mark based on the natural resources and industry of the country would be quite unrealistic. . . . As the situation is at present contrived, the wildlife resources of the Territory are the most important ones and over half the population depends on them almost entirely for existence. There are comparatively few people in Alaska unaffected by the status of wildlife. The situation may be expected to change, but even then, indifference to the fate of the wildlife would be rank improvidence. We believe that Alaska's scenery, remoteness, and wildlife can be her greatest continuing resource, in that tourism could well become one of the prime industries which will directly supplement her principal income now derived from the salmon fishery. The attraction of Alaska for the tourist will not be the man-made amusements of a Miami but the beauties of natural habitats and their denizens, maintained through conservation. The degraded habitat of the ecological climax broken through human misuse carries none of the joy and rehabilitative quality of the truly natural scene.

No one with any direct interest in Alaska's future – that should include Americans in general – can afford to ignore the opinion of two leading experts in wildlife ecology and resource conservation, who are as hard-headed and practical as they are idealistic. Dr. Darling is senior lecturer in ecology and conservation in the University of Edinburgh. Dr. Leopold, *PD's* conservation editor, needs no introduction here; he is an associate professor of zoölogy in the University of California, game management his specialty. He is secretary of the California Academy of Sciences and director of the Sierra Club. D.G.K.

Harp seal solo

A Seal's World: *an account of the first three years in the life of a harp seal.* By Frank Stuart. McGraw-Hill Book Company, Inc., New York. 1954. 224 pp., drawings by Walter Ferguson. $4.00.

A new kind of nature writing rose to success a decade ago with Sally Carrighar's *One Day on Beetle Rock*. Its feat was projection into the animal mind and world from a base of natural history, making animals sans anthropomorphism the principals in fiction which is essentially true – natural history in story form.

With *City of the Bees* (1949) and *Wild Wings* (1952) the English novelist Frank Stuart earned his place at the top in this kind of thing. *A Seal's World*, his latest, concerns the Wanderer, born on a White Sea ice floe, orphaned in a grinding storm, separated from her tribe in a chase by killer whales, and carried westward in the northern seas. Three years and 10,000 miles later overpowering instinct had returned her to home ground for mating with one of her own harp seal kind. What happens to the Wanderer between the Barents Sea, the American coast, and her final dash for home around Norway is stuff for a novel–plotless to be sure – and when at the last she finds with her chosen mate the contentment of the deep, you realize you have been reading one, a very exciting one, at that.

What stays, however, is the compelling experience of the wild life of arctic waters and shores, where seal and fish, polar bear and fox, walrus and whale, Eskimo hunter and fisherman mesh in an endless web of striving to stay alive and perpetuate their kind. It is cruel but splendid drama, on nature's harshest and grandest scene. Stuart plays his story to the hilt, but with unfailing truth to nature backed by the acknowledged aid of such scientists as our own Victor B. Scheffer, and Erling Sivertsen of Trondheim, "the world's principal authority on the biology of the harp seal." *A Seal's World* is natural history in a literary form of universal appeal; Frank Stuart has cast it in superb style, skilfully avoiding the many pitfalls possible when two customarily exclusive forms are mixed. D.G.K.

Fresh-Water Invertebrates of the United States. By Robert W. Pennak. The Ronald Press Company, New York. 1953. ix + 769 pp., 470 text figs. in line and halftone. $14.00.

A 35-year lapse in the comprehensive treatment of American fresh-water invertebrates has now been ended with the publicaton of this volume by a professor of biology in the University of Colorado. Stressing natural history, ecology, and taxonomy, with a minimum of anatomy and physiology, Dr. Pennak has also bridged the gap between such an excellent popular handbook as Dr. Ann Morgan's perennial *Field Book of Ponds and Streams* and the highly technical literature copiously cited at the end of each of his own chapters. This suggests truthfully that although the new book stands at the level of the college senior and beginning graduate student, it is by no means over the head of any well grounded amateur whose interest runs deep and persistent – such a user does not quail at keys and terms; he masters them. Anyhow, at least 2,300 individual subjects are illustrated.

The Wonderful World of Insects. By Albro T. Gaul. Rinehart & Company, Inc., New York. 1953. 290 pp., 47 full-page photographs. $4.00.

Albro T. Gaul has had a variety of professional experience with insects which causes him to know especially well how insects and people affect each other, and what things most people want to know about insects. In *The Wonderful World of Insects* he goes into such things as insect sense of taste compared with human; the ways of life of the principal kinds of insects; parasites and pests; storage problems caused by insects (he is a consultant in this sort of thing); insect past and future – he reassures us that, having spent the last 375,000,000 years trying, insects are not likely to take over the earth in any predictable future. Certainly one of the best of the current popular insect books.

The Mammal Guide: *mammals of North America north of Mexico.* By Ralph S. Palmer. Doubleday & Company, Inc., Garden City, New York. 1954. 384 pp., profusely illustrated in line and color. $4.95.

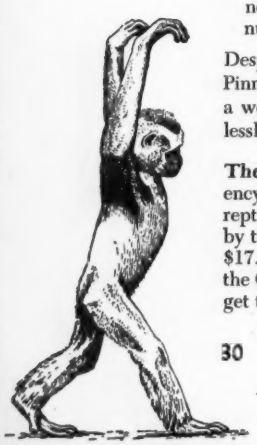
The State Zoölogist, New York State Museum and State Science Service, has added to the growing numbers of wild-life handbooks for general use. This mammal guide is well furnished with distribution maps. The author's color figures are a bit awkward, but will serve their purpose. Habitat, reproduction, habits, and economic status follow species descriptions.

Curious Creatures. Written and illustrated by Erna Pinner. Philosophical Library, New York. 1953. 256 pp., numerous halftone drawings. $4.75.

Despite a rather strange stylization of her drawings, Erna Pinner has compiled from the gleanings of travel and study a worthwhile contribution to knowledge of nature's endlessly varied ways among vertebrates and invertebrates.

The Animal Kingdom a 2062-page, 3-volume popular encyclopedia of the world's mammals, birds, amphibians, reptiles, fishes, invertebrates, and insects will be published by the Greystone Press, New York, on September 7. Price: $17.50. If you order through your book store or through the California Academy of Sciences, by that date, you may get the boxed set at the pre-publication price, $14.95. Our set came just as we go to press, too late for review now, but we can say it will make a handsome gift for the entire family – especially one with children. Written by staff members o fthe American Museum of Natural History and the New York Zoological Society, it is authoritative. There are 550 illustrations – line, halftone, 20 full-color pages.

Amphibians and Reptiles of Western North America, by Robert C. Stebbins (McGraw-Hill, probably $$8.50), coming out September 28, will be a major addition to the libraries of Western naturalists. The author is curator of herpetology in the Museum of Vertebrate Zoology, University of California – his own illustrator, and one of the best in the business.



Bipedal walk of the black gibbon.

DISCOVERY IN BOOKS

Animal ways, human thinking

Animals, Men and Myths: *an informative and entertaining history of Man and the animals around him.* By Richard Lewinsohn. Translated from the German. Harper & Brothers, New York. 1954. xviii + 422 pp., 80 text figs., 31 pages of halftones. $5.00.

The Natural History of Mammals. By François Bourlière. Translated from the French by H. M. Parshley. Alfred A. Knopf, New York. 1954. xxi + 363 + xi (index) pp., 97 text figs., 24 halftones. $5.00.

Ways of Mammals *in fact and fancy.* By Clifford B. Moore. The Ronald Press Company, New York. 1953. xi + 273 pp. $3.50.

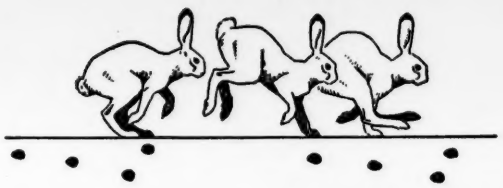
The Sex Life of Wild Animals: *a North American study.* By Eugene Burns. Rinehart & Company, Inc., New York. 1953. xiii + 290 pp. $3.00.

How Animals Move. By James Gray (The Royal Institution Christmas Lectures 1951). Cambridge University Press, Cambridge. 1953. xii + 114 pp., 52 text figs., 15 halftone plates. $3.00.

The nature of animals and man's beliefs about animal nature have been wide apart or close together through the ages, with a gradual though not consistent trend toward closing the gap between the two. We may be sure the Stone Age hunter took a pragmatic approach to his fellow animals; cave painters – the first animal artists of record – were strikingly realistic, which means they were good observers. When man took to farming he had less and less to do directly with wild animals, so his thinking took wild turns. He even invented new ones, and could persuade himself they existed.

The history of the association between animals and man and of man's thoughts and deeds respecting them has long needed telling in a single book for general enjoyment. It has come at last – *Animals, Men and Myths,* from the versatile mind of Richard Lewinsohn, M.D., political scientist, economist, writer, and world traveler. whom we suspect wrote this scholarly yet thoroughly entertaining book because he wanted such a book to be written. At least, it has the fresh, sustained quality of something done for the sheer pleasure and satisfaction in doing it. It is all ways equal to *Gods, Graves, and Scholars,* and goes forth, indeed, with the blessing of C. W. Ceram's introduction.

Dr. Lewinsohn goes quickly from animal beginnings to man's arrival, tells how animals became sacred, tabu,



Gallop of the hare.

heroes of Greek literature, instruments of warfare, subjects of philosophical debate, tragic pawns in Roman circuses, objects of commercial exploitation, romantic idealization, scientific debate, and laboratory experiment. Man has identified himself with animals, ascribed his own characteristics to them, feared, loved, exterminated, preserved them; today he is "subjecting the animal kingdom to his will in ever wider measure" In fact, a very big proportion of the larger animals still extant will remain or vanish from earth at man's future choice.

Animals, Men and Myths might be summarized as an historical exposition of man's subjective vs. objective behavior towards his fellow animals. One of those unique books that refuse to be typed, it should become part of the literary equipage of every wide-ranging mind.

If your nature library needs a general *Natural History of Mammals,* you could find no more attractive and satisfying book than the one of that title by François Bourlière, associate professor of medical biology in the University of Paris. Most animal books name you an animal, tell you where he lives, what he does. *The Natural History of Mammals* takes up animal behavior topically – e.g., "Locomotion" (a chapter): aërial, two kinds – gliding; flapping flight. "Among the mammals, [the latter] is found only in the Chiroptera, or bats, which have indeed become as aerial as the birds." Various bats and their peculiarities of flight are described; nor is the subject concluded without an excellent account of bats "echo-sounding" flight. The bats enter again under "Food and Feeding Habits," "Defense and Protection," "Sexual Life and Reproduction," and so on. One chapter takes environment as a topic; one may be of interest chiefly to specialists – "The Structure and Dynamics of Natural Populations." A "Taxonomic List of Species, with Common Names" gives the order and family relationships of some 315 of the world's principal species. The text is well documented, and there are general and special bibliographies besides. In our opinion, this book is uncommonly well illustrated.

The vast sweep of Lewinsohn's book necessarily left much detail to others. If you want to know more false beliefs and superstitions that have been held–an amazing number still persist – and what the true facts of the matter are, about cats, bats, elephants, dogs, horses, monkeys ("monkeys monkey: they don't ape"), or what have you – most of the answers are in *Ways of Mammals* by Clifford B. Moore. Such a book is bound to be fascinating, and Mr. Moore, who is director of the Forest Park Museum in Springfield, Mass., has brought humor as well as knowledge and obvious affection for animals to the writing of it. After the chapters on various kinds of animals he takes up some questions of perennial popular interest: how well do animals see in the dark? are they reliable weather prophets? can they be hypnotized? can animals of different species interbreed? and many others. A final section takes up "travelers' tales and tall tales." The whole book is thoroughly documented and has an extensive bibliography.

A book that has inevitably been called the Kinsey Report on the mammals is Eugene Burns' study of *The Sex Life of Wild Animals.* Any implication of sensationalism is a commentary on the human mind! People are always *thinking* about sex: animals are just busy doing what comes naturally. Nature minds her own business and leaves curiosity to man. There is enough intriguing detail in this book to satisfy the most curious; but it soon becomes evident that the naturalist-author, of Sausalito, California, is deeply concerned with the mechanisms of continuing animal life, fluctuation of populations – the controls that work for or against increase to maintain optimums. And he extends his closing observations to include the problem of excessive human reproduction that threatens us with untold future misery. He believes that studying the ways of our animal relatives may help us reach a solution.

"If I could fly like a bird! – swim like a fish! – run like an antelope!" How often we say something like that! Just how do animals move in the air, in the water, and on the ground, in all their various ways? What are the mechanics and physics of animal motion – including our own? A professor of zoölogy in the University of Cambridge tells us precisely in *How Animals Move.* What goes on, actually, when a snake seems to "flow" along without apparent effort at all? Such things are clearly diagrammed in this book – we see, for instance, why "a grass-snake readily glides through a sinuous glass tube (but) cannot glide around the arc of a circle or along a straight line." This is one of those books that provides fundamental information in a way we can all grasp. D.G.K.

Erect bipedal posture of Waller's gazelle browsing.

Book references for Editorial (pages 2-3):

The Way of the World: *the Rushton Lectures for 1952.* By George H. T. Kimble. George Grady Press, New York. 1953. x + 123 pp. $2.50.

The Limits of the Earth. By Fairfield Osborn. Little, Brown and Company, Boston. 1953. x + 238 pp. $3.50.

Land For Tomorrow: *the underdeveloped world.* By L. Dudley Stamp. Indiana University Press, Bloomington; American Geographical Society, New York. 1952. 230 pp., maps, charts. $4.00.

The Challenge of Man's Future: *an inquiry concerning the condition of man during the years that lie ahead.* By Harrison Brown. The Viking Press, New York. 1954. xii + 290 pp., charts, diagrams. $3.75.

The Triumph of the Tree. By John Stewart Collins. William Sloane Associates, New York. 1954. x + 276 pp. $3.50.

Climate, Vegetation and Man. By Leonard Hadlow. Philosophical Library, New York. 1953. 288 pp., profusely illustrated with maps, diagrams, photographs. $4.75.

Geography of Living Things. By M. S. Anderson. Philosophical Library, New York. (n.d.) 202 pp. $2.75.

The last two books are excellent for background reading. Mr. Hadlow's readable textbook deals geographically with the two chief natural factors affecting man ecologically in his widely varying habitats. Mr. Anderson takes up the complex subject of biogeography – "the study of the biological relations between man, considered as an animal, and the whole of his animate and inanimate physical environment" – in a manner purposely designed for self teaching. The approach is philosophical, the point of view historical. Chapters central to our editorial theme are two on "Man and His Food" and three on "The Soil" and its conservation.

The three drawings are from *The Natural History of Mammals,* courtesy of Alfred A. Knopf, Inc., New York.

Drake file: top secret

EDITOR, *Pacific Discovery:*

Recently Robert H. Power, using an inset from a Hondius map of around 1590, concluded that Sir Francis Drake's California landing site was San Francisco Bay ["Portus Novae Albionis Rediscovered?" *PD*, May-June 1954]. In conjunction with the inset, Power's argument was based on words of the character employed by Stratfordians in discussing the life and writings of Shakespeare; words such as: ". . . the source of these plans may have been . . . it is reasonable to assume . . . probably completely drawn . . . could have remembered . . . probably named . . ."

While it is not my intention to attempt to show that Drake could not have landed on the shore of San Francisco Bay, nevertheless I submit that the evidence adduced by Power is insufficient to support his contention.

First, consider the Hondius map itself, as well as the science of cartography as it existed in the 16th century. Hondius, like all mapmakers of his time, relied greatly on verbal reports given by returned navigators and even less specialized seamen. Changes in accordance with these reports were made on existing plates, or new plates were engraved if a sufficient amount of new information was produced. . . .

Power says, in discussing the Hondius insets, "The source of these plans may have been the log of the *Golden Hind*, a document long lost." The greater likelihood is that Hondius or his assistants questioned members of Drake's company upon their return to England more than a year following the California visit, and subsequent to which other places strange to the English had been visited. The interview, and any existing and available reports, were used as a basis in drawing the map and insets. Ships' logs in those days were guarded with restrictions accorded our present day Top Secret documents.

The insets, other than those of New Albion, have been identified with some accuracy, and therefore Power assumes the California inset is reasonably accurate, even though he violates his implication by adding the following: "Also, it is reasonable to assume the artist might have omitted drawing the island from which he was making his sketch." Both assumptions are ill-founded. The insets identified show (small) harbors previously known, if not to the English, then to the Spanish and Portuguese.

The New Albion inset is an attempt to depict a harbor of somewhat larger size than the others and at the same time one unknown to any European before that time. Even known harbors were crudely charted, long after 1590. The writer has in his collection a map of North America, drawn in 1763 and showing as insets harbors used almost daily by the British. Yet, comparing them with modern charts, one is required to exercise imagination in order to find a close resemblance.

Power states: "If northern San Francisco Bay is *Portus Novae Albionis*, then the cartographer oriented his map with the latitude and longitude of the globe." One of the recorded versions of Drake's landing reveals that the harbor was found at 38° while another indicates 38° 30′, neither of which is on a line through San Francisco Bay [Lat. 38° lies about a mile north of the strait between San Francisco and San Pablo bays.—ED.]. Latitude, in the days of Drake, could be determined accurately with the navigational equipment then available. Longitude was a factor no navigator could ascertain (for another) 200 years. . . .

It is also noted by Power that the Hondius inset shows, "several trees which greatly resemble oaks." No mention is made of the village also shown. Is it an Indian village of English houses? Or, did Drake's group construct a town during their stay of five weeks? Actually, the trees and the village are the conventionalized symbols used by cartographers of that period and for a hundred years later. Examine any map of that period — of Germany, England, or even the mythical Kingdom of Preston John — and there will be found the same trees and houses, indicating nothing more than a wooded area and a town. One who relies on the accuracy of the 16th century cartographer's work is leaning on fragile stuff. Especially is this true if the effort of the cartographer fails to include the spot he used as a base for making a supposedly reliable drawing of the area surrounding him . . .

Now, as to the description of the Bay itself. Power reasons that the Hakluyt record ". . . it pleased God to send us into a faire and good Baye . . ." can only be interpreted as meaning excellent. He ignores the contemporary notes of Fletcher which call it "A convenient and fit harborough." Credit to Divine Providence was given often in Elizabethan speech and writing, more so than now and no more aptly. A dispassionate reading of either description of the bay where Drake landed certainly shows an unenthusiastic description of the Golden Gate and the Bay beyond, especially in view of the fact that Drake was making every effort to acquire domains of value for the queen. Had he entered San Francisco Bay Drake would have recognized it for what it was then and is now — one of the greatest anchorages in the world. Elizabethan superlatives in its praise would have filled pages of his report. Such a discovery would have been worth keeping under English control . . . (but Drake's anchorage wasn't worth keeping).

As part of his argument Power has submitted an old engraving showing Drake crowned King by the Indians of New Albion. Power would show that the scene is of San Quentin Point as it was then topographically, with the distant hills in the background drawn with amazing accuracy. However, Power does not disclose the date of the engraving nor the book it was intended to illustrate. It is true that Drake had aboard with him a corps of artists whose pictures in color of the coast past which the group sailed were so truthful in their rendition that the captured Spaniards were impressed. These pictures were for the use of navigators who later might coast South, Central and North America and were assigned the same confidential classification as more reliable sailing charts, obtained on behalf of a Sovereign through actual physical mapping. So far as the writer knows, no example of the work produced by these artists is extant. Book illustration in Elizabethan times (if such be the date of the engraving) was even less accurate than cartography. An illustration of this nature was entirely fanciful, doing nothing more than to show what was suggested to the artist by the text. One who reads into this illustration a belief in its photographically true reproduction of the event and scenery is bringing to life that which existed in the artist's imagination only. . . .

A. D. COFFMAN

Palo Alto, May 21, 1954

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